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Cable Progress

THIS winter's I.E.E. Session opened well, with the largest attendance we can recall. The president's address well maintained the high standard set by Mr. P. V. Hunter's predecessors, as it provided an authoritative commentary on matters of the hour and emphasised an aspect with which his name is especially associated. We would commend Mr. Hunter's views on the benefits of regulation in industry to the attention of the economic study groups, and his comparison between the co-ordination of generation and of distribution to all who desire to get at the basic facts of this question.

Regarding distribution, the effect of controversial legislation on electrical development would probably be unfavourable, as he stated, but the example he chose is surely open to argument; the year 1926, when the last Act was passed was also the year of the General Strike and a prolonged dispute in the coalfields, which presumably were important factors contributing to the decline in the output of electricity. Mr. Hunter referred to the serious disadvantages under which the small areas are operated with regard to publicity and salesmanship. Might not an improvement in these respects be enough to balance any setback due to political uncertainty.

From the technical point of view, the most interesting part of Mr. Hunter's address was his advocacy of a reduction in the dielectric thickness of 11-kV cables to give a maximum stress of over 50 kV per cm., instead of the present limit of 22.5 kV—a theme that he worked out in greater detail at the first informal meeting on Monday. The running of 11-kV standard 0.05 sq. in. cables across country, instead of pole lines, is an interesting possibility. Its economic value—and, as the President stated, the outlook of the modern engineer is primarily economic—will presumably depend largely upon the longer life allowed to cable (forty years) compared with that of an overhead line (twenty years).

For "super-voltage" cables electrical characteristics very greatly predominate over mechanical. In spite of the promising achievements of oil-filled, gas-pressure and gas-filled cables, it would appear that we shall have to go once more to the physicist before we can bring cables on to a competitive basis with overhead lines. There are, however, conditions in which economy is not the governing factor, as we believe that the use of 132-kV cables will be necessary, in streets where the sub-soil is congested, in order to interconnect grid sub-stations with load centres.

Although during the past two years so much advance has been made in manufacturing processes, machinery, material and technique, we do not see much prospect of super-voltage cables being preferred to overhead lines in the early future. Even if we can reduce the cost of such cables sufficiently, and can entirely get over troubles due to ionisation, there remains the problem of dealing with capacity currents. It may be that we shall have to await the development of high-voltage d.c. transmission before underground cables come into their own.

E.D.A.'s New Chairman

By a unanimous vote of the Council Sir William Ray, M.P., L.C.C., has been appointed executive chairman of the Electrical Development Association. That the Council which knows the work of the organisation so well should have been able to come to a unanimous decision is a matter for general satisfaction. Anything short of such a result would have opened the door for trouble. The Council has done its best—it must feel relieved that this particular matter is settled—and Sir William Ray will be able to take up office with the definite knowledge that those who have elected him have confidence in his ability to carry out the important duties that will fall to him. He lays no claim whatever to electro-technical qualifications, but, as is indicated in some notes published later in this issue, he has had a very wide experience in big organisation and "intercourse" work which should be of

peculiar value as he cultivates the acquaintance of many electrical authorities and establishes happy relations with the staff. During the next few weeks or months Sir William will be learning the ropes of the electricity supply industry, and will be visiting some of the outposts of E.D.A. in the country. He attaches great importance to what he will be able to do by means of personal contact with authorities in all sorts of places. The industry will join with us in hoping that in due course the appointment will be more than justified.

A Serious Evasion

IN order that the development of electricity in municipal areas might not be restricted by the application of substantial portions of surplus income to the relief of local rates, a clause was embodied in the 1926 Act definitely limiting the amount which could be thus allocated. The will of Parliament has been evaded, as Mr. J. N. Waite shows in his address as chairman of the North Midland Centre of the I.E.E., by putting up the assessments of some undertakings to figures that appear to bear no relation to reason or equity. Just after the passing of the Act the rates paid by all undertakings were equivalent to 38 per cent. of the fuel cost, but since then, as the last returns of the Electricity Commissioners show, the percentage has become 59. The present chaos is shown by the enormous variation between the highest- and lowest-rated undertakings. Expressed as a percentage of capital expenditure, the range is from 3.5 to 0.12, or, of gross annual revenue, from 15.73 to 0.40. In the worst area rates add 0.83d. per kWh sold, a figure that is approximately equal to the average rate charged for motive power throughout the country; this is eighty-three times as much as the figure in the lowest-rated area. United action is called for lest the quinquennial reassessment this year should lay a still heavier burden upon consumers.

The Dead Hand

WRITING to a daily paper, Mr. J. W. Banfield, M.P., states that, while the number of domestic consumers has increased by more than half a million during the past twelve months, the benefits of electricity are being withheld from householders by some municipalities. This he attributes to the ownership by the same authorities of gasworks. We have often pointed out instances of this restraining influence on electrical development, and, while it is by no means the only cause of backwardness, it is an important factor. Mr. Banfield suggested that housewives should bring pressure to bear on candidates at the municipal elections to rectify this attitude of local councils. This might do some immediate good, but any Bill that may be introduced in the future to deal with distribution should include provisions to make such an attitude impossible.

The Latest Grid Tariff

TRADING under the grid scheme is to begin with the New Year in the South-East and East England Areas, the combined population of which is close on 30 per cent. of that of the whole country. The tariff quoted by the Central Electricity Board is on the same lines as that now in force in Mid-East England and Central Scotland, allowing for differences in station efficiency, cost of coal, and local rates. The issuing of separate tariffs for the regional areas as they become ready for this stage has its good points, as it enables undertakings to gain experience of working together under the tariffs before final conditions are reached. To do otherwise would be to delay trading until the frequency standardisation schemes are completed. Reports indicate that the latter are going through without the hitches which might reasonably have been anticipated; this reflects considerable credit on the organisations set up by the undertakings involved, chiefly in the Central and North-East England areas. In nine months' grid working in the Central Scotland and Mid-East England Areas the actual costs have come out below the estimated figures. This satisfactory result, we think, may be attributed in great part to the team spirit shown by the members of the area advisory committees, who are drawn from the local supply undertakings. Indeed, we believe the growth of this spirit will prove not the least of the benefits derived from electrical interconnection.

A Public Lighting Controversy

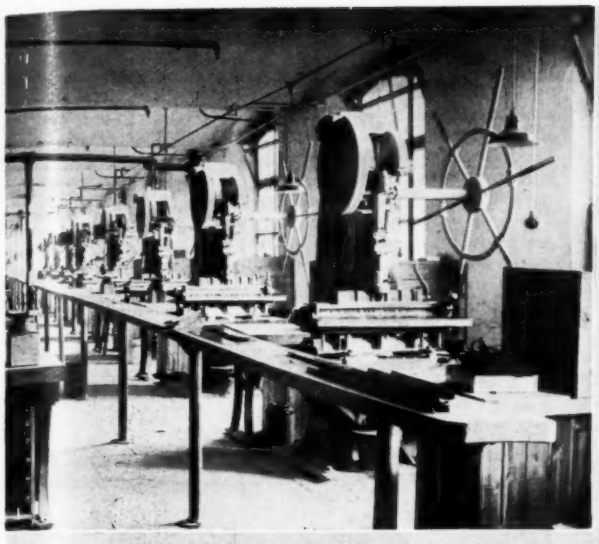
THE Lewisham Council has referred back to its Works Committee a report prepared by the latter, in conjunction with a sub-committee appointed to test the merits of electric discharge lamps for public lighting. This report strongly recommends the installation of electricity in seven miles of roads in West Lewisham, on the ground that the new lamps installed by the South Metropolitan Co. provide undoubtedly the finest form of street illumination yet devised, from the points of view of penetration in fog, absence of glare and shadow, economy, and the safety of pedestrians and motor drivers. The amendment to refer the report back for further consideration was carried by a narrow margin, *viz.*, 27 to 24 votes; but the casting of any votes at all against the system indicates that if the Works Committee's strongly expressed opinion is correct, and we think that every non-prejudiced person must agree with its verdict, the new electric lamps will not be allowed to succeed as a matter of course on their merits alone. The formal reconsideration of its report by the Works Committee will only delay matters, as we do not see how it can resubmit its recommendation in any other terms.

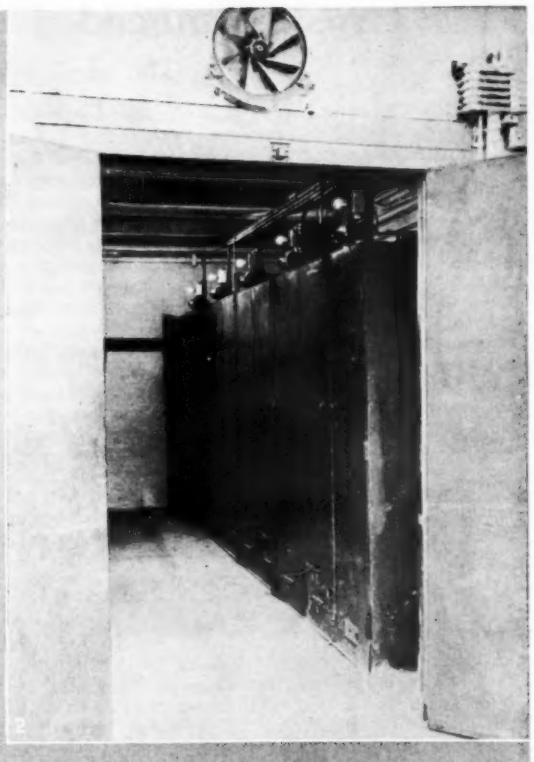
Where the Therm Goes

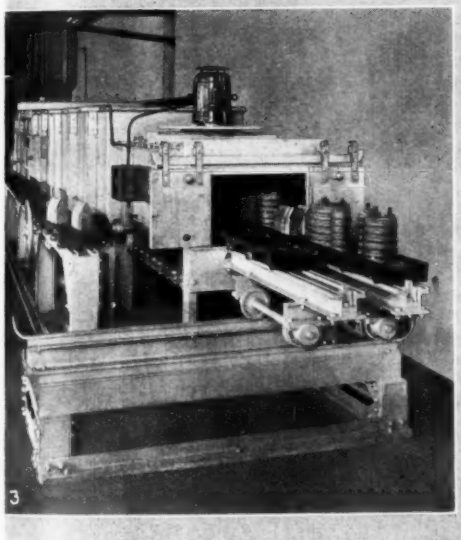
NEWSPAPER controversy has followed Mr. J. M. Kennedy's presidential address to the Association of Supervising Electrical Engineers regarding the comparative amounts of coal used in the production of electricity and gas. Mr. A. C. Cramb, director of E.D.A., draws attention to two important points, *viz.*, the effect of utilisation efficiency and the low-grade quality of coal that can be used in electric power stations. Last week we showed that 2,370 B.th.u. would be available for space heating for every pound of coal (11,800 B.th.u. only) burned at Clarence Dock Power Station, *i.e.*, with the efficiency that we may expect in the future; the overall efficiency is thus about 20 per cent. Taking the calorific value of coal for gas-making at 13,400 B.th.u. per lb., the losses in a continuous vertical retort and the coke used on the works would account for 2,200 B.th.u. After deducting the heat value of coke and residuals for disposal, we get about 3,500 B.th.u. supplied in the form of gas to consumers. Taking 35 per cent. as the net utilisation efficiency of gas for space heating, 1,230 B.th.u., or less than 10 per cent. of the heat in coal, can be effectively used by the owner of the gas fire. That is why electricity at $\frac{3}{4}$d. per kWh costs no more than gas at $7\frac{1}{2}$d. per therm.

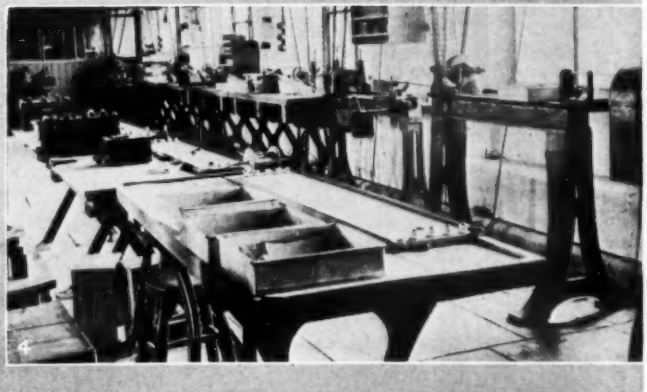
Our February Fair

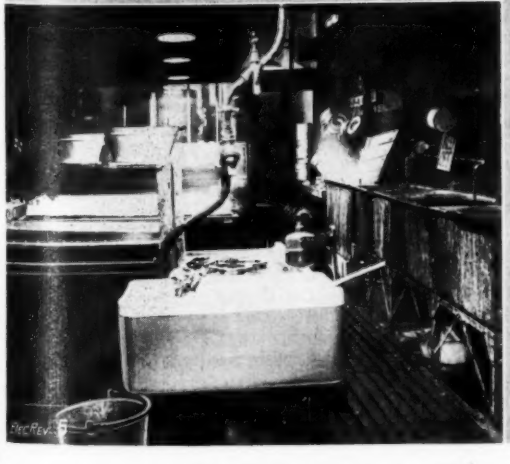
THE British Industries Fair is well maintaining its reputation for continuous expansion. When the Heavy Industries Section opens at Castle Bromwich on February 19th, 1934, it will have exhibits covering a much larger space than has been occupied on any previous occasion. Further additions are now being made to the buildings, and the Birmingham Chamber of Commerce, which is responsible for the Section, is to be congratulated upon the fact that already—four months in advance of the opening—the bookings constitute a record. The demand of the electrical group is partly responsible for the extensions that are now in hand. It is true that it has been possible to meet the additional demand, but exhibitors who are still hesitating are urged to make up their minds quickly and lodge their applications early, or they will be too late, as the demand for space in all trade groups at Castle Bromwich is heavy, and that allotted to electrical exhibits must of necessity be rationed, just as it is for others.

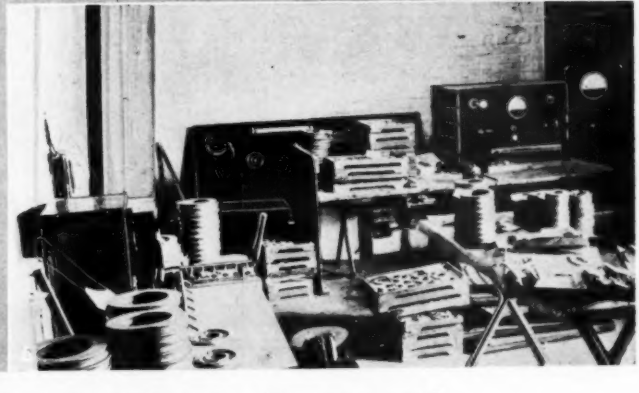












The Manufacture of Embedded Heating Elements. **(See next page)**

1. Machines for making strip and ring elements on which the spirals are inserted in the refractory. 2. The low-temperature drying ovens. 3. The maturing furnace. 4. Spiralling machines in the rear, cutting-off machines in the front, with resistance measuring equipment. 5. Part of the electro-plating shop for immersion heaters and boiling-ring oxidising. 6. Room in which a test pressure of 1,500 V is applied for one minute

Embedded Heating Elements

The production of one popular type

BECAUSE the embedded type of element has become so widely employed nowadays in connection with both domestic and industrial equipment, we feel that there should be a wider knowledge among electrical users of the methods employed for its production, and we are indebted to Messrs. George Bray & Co., Ltd., Leeds, for enabling us to publish the following account of one popular type—"Chromalox." These are made in circular form for cookers, boiling plates, &c., and in straight form for immersion heater blades and as strip heaters for industrial heating applications.

Briefly, the element consists of an 80/20 nickel-chrome spiral embedded in a special refractory, the whole being sheathed in a 20 per cent. chromium steel sheathing. To produce a dull black surface to afford maximum radiation, the chromium-steel sheaths of the boiling rings are specially oxidised by a method similar to electroplating, while as a special precaution the interiors of the units are sand-blasted to remove any burrs, &c., from the surfaces.

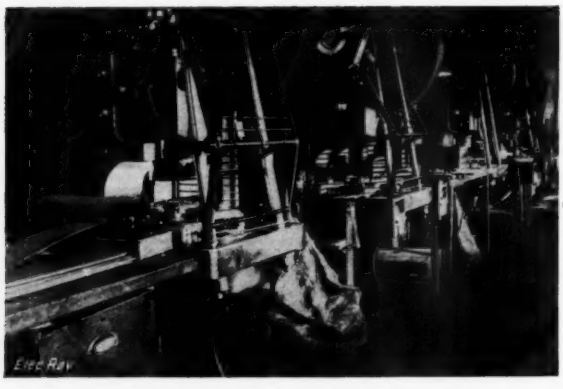
The nickel-chrome wire is dealt with in the special spiralling machines, and each spiral is cut into the correct length to an exact ohmic value representing its rated wattage, when run on the voltage for which the finished ring or strip is designed.

After spiralling, the terminals are pressed on to the wire in such a manner as to give a perfect connection between the wire and the terminal, without any risk of damaging the wire at the point of juncture. The spiral, with its terminals, after an ohmic resistance test, is mounted on formers so designed that the spacing between turns is even throughout the whole of its length, and so that in the embedding process the operator and inspector can see that the turns are definitely at even spacing. The actual embedding in the refractory material is effected in such a manner as to ensure an even spacing between each turn in the spiral and also between the spiral and sheath. The refractory material completely surrounds the resistor wire throughout the whole of its length. The precautions taken ensure that the spiral runs at an even temperature throughout its length, thus avoiding hot spots.

Maturing the Refractory

The refractory material used is a special mixture which, whilst having a high electrical insulation resistance, has a relatively low heat resistance. This, coupled with the small distance between the wire and sheath of the unit, gives a very small temperature gradient between the spiral and the sheath. The arrangement of the formers in the embedding process is such that the spacing between the spiral and sheath, and between rows, is exactly as designed, and inadvertent closing up between turns is impossible, which again is a feature necessary in overcoming hot spots.

After the embedding of the spiral the rings and strips are dried before being fitted with covers in order to make a totally enclosed unit. They are then tested for continuity. After this they are hydraulically pressed to ensure the refractory

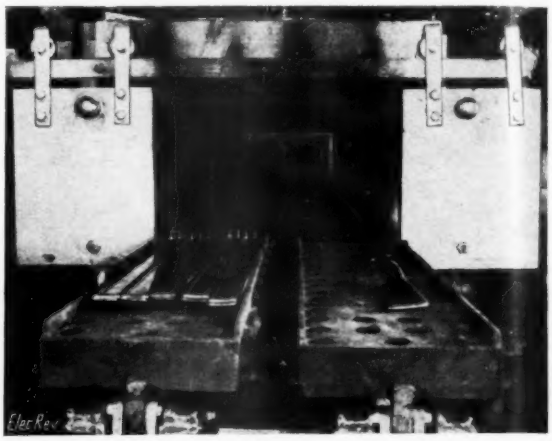


A line of presses for stamping sheaths

being properly compacted, when they are passed through an automatic electrically heated oven in which they are heated to a temperature of 800 deg. C. in order to mature the refractory.

The furnace used is so arranged that the strips and rings can be fed into it from both ends. The dimensions are 45 ft. long and the loading is 70 kW. It is thermostatically controlled, and the maximum temperature reached is 800 deg. C. The units are carried on a chain conveyor and are slowly fed through from one end to the centre, where the temperature is the greatest, and then they pass slowly to the other end where they are unloaded. The period of time is approximately twelve hours. This slow movement from cold to maximum temperature, and the subsequent slow reducing of the temperature, ensures perfect maturing without any fear of distortion. The furnace, supplied by G. W. B. Electric Furnaces, Ltd., is of the tunnel type and similar to those installed in the potteries for glaze firing. For drying the elements before the maturing of the refractory there are six low-temperature ovens, each measuring 4 ft. 6 in. wide, 3 ft. 4 in. deep, and 6 ft. 3 in. high, and loaded at 4.4 kW with "Chromalox" strip heaters.

After the firing process the units are each examined for ohmic resistance, in order to ensure that no damage has been



Looking into the tunnel furnace during firing

done in the manufacturing process, and are all tested under a pressure of 1,500 V a.c., 50 cycles between the spiral and the sheath for a period of one minute. The company has recently produced heaters for use on high-pressure systems, and these were pressure tested at 4,000 V a.c. After testing, terminal insulators, nuts and washers are fitted and, in the case of the boiling-ring elements fitted into cast-iron mounts for boiling plates, a further test is made

A Wide Selection

Some idea of the very wide range of both strip and ring heaters of standard design is given by the following figures. There are fifty-five different sizes and types of ring heaters, some being fitted with mounting rivets, some being used for single heat, and some designed for three-heat control. There are sixty-six different lengths of strip heaters, varying from an overall length of 5¼ in. to 42⅜ in. These strip heaters can be wound for varying loadings, according to the nature of the applications, from 10 W to 2,300 W, for any standard pressure up to 250 V, either a.c. or d.c. There are also special high-voltage strip heaters for certain special applications.

Apart from the standard strip and ring heaters there are a number of special units such as the brick-press element, used for heating dies and moulds of brick-press machines, the size of these elements being roughly 6¾ in. by 3 in. The strip heaters are made for single heat control, with either two terminals at one end, or one terminal at each end, while three-heat strips are made fitted with three terminals.

The half-sheathed "KB" type of ring heater is not of the totally enclosed design, and is used for heating wash-boilers, kettles, sterilisers, metal melting pots, and other appliances to which it is clamped hard up to the bottom or sides of the vessel, and in this way protected from moisture and the elements. Being only half sheathed its mass is reduced, resulting in an increased initial heating speed and a reduction of residual heat, a feature necessary for quick heating. Further, its application is such that a total chromium steel sheathing is not necessary, with resultant lower production costs.

As it is designed specially for the applications given above, where it is clamped tightly to the article to be heated, the heat transfer is rapid, and a higher loading than its counterparts in the totally enclosed design can be reached, thus the "A" type ring heater, which has a maximum loading of 950 W for certain applications need not be used, whilst the "KB" pattern with a loading of 1,400 W can be used. A feature of the ring heater is that two different sized ring heaters can be mounted, one inside the other, when loadings up to 2,250 W can be accommodated in a diameter of 5⅝ in.

Induction Motor Development. By D. Dyson Rayner, A.M.I.E.E.

A squirrel-cage machine with an auxiliary core

THE principle of inserting reactance in the secondary circuit of an induction motor to limit the starting current is not new, as patents were granted to several engineers as long ago as 1899 and 1900. In all cases the motor was provided with a wound rotor, the windings of which were connected to inductance coils, *via* the slip rings, or mounted inside the rotor spider, thereby eliminating the necessity for slip rings.

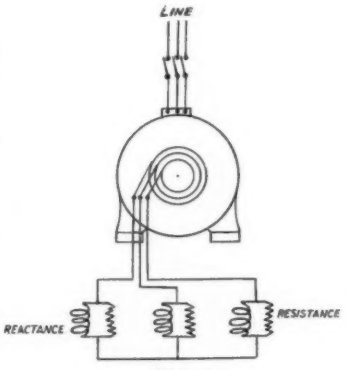


Fig. 1

In one scheme (shown diagramatically in fig. 1) resistances are connected in parallel with the reactances, so that on closing the switch controlling the primary circuit with the rotor at standstill the induced secondary current has the choice of two paths, the amount of current through each depending upon the relative values of resistance and reactance.

The starting torque is provided by a combination of iron loss incurred in the cores of the inductance coils and energy spent in the resistances; the design can provide for any value up to about twice full load torque with a current of approximately two and a half times full load value. By omitting the resistances, a starting torque up to one and a half times normal is available with about twice full-load current.

Schemes embodying the foregoing principle were devised with a view to producing an automatic starting arrangement for induction motors requiring a fairly large starting torque that should not be unduly inferior to squirrel-cage motors as regards simplicity of construction and ease of manufacture, and yet should be superior to the latter in requiring less current for a given starting torque.

Although an induction motor constructed as described provides full automatic starting by simply closing the main switch, without the use of complicated control gear, it does not appear to have been developed for general industrial purposes, possibly owing to the robustness and low cost of the squirrel-cage motor.

Adaptation of the Eddy-current Starter

What is known as the eddy-current starter has attained a certain measure of success in connection with slip-ring motors in a restricted number of applications, particularly reversing rolling mills. Its limitations appear to be due to constructional rather than technical difficulties, chiefly in connection with the heating of the coils surrounding the iron cores of the reactances.

The accelerating torque during speeding up is due partly to the eddy-currents, which vary as the square of the frequency, and hysteresis loss, which varies with the first power of the frequency, and partly to the copper losses. The iron losses predominate at low speeds and the copper loss as full speed is reached. On reversal of the stator connections, a heavy torque is established which first retards the motor to standstill and then accelerates it in the opposite direction.

When such a cycle is repeated frequently the iron cores of the starter heat up considerably, and so to avoid risk of scorching the windings the dimensions become larger than would otherwise be the case; the iron, surrounded as it is by the coils is in a bad position to dissipate the heat.

By applying the principle to a squirrel-cage motor, and embodying the starter in the construction of the rotor, most difficulties associated with the separate eddy-current starter have been overcome, in addition to which the advantages of the squirrel-cage motor over the slip-ring type are retained.

This is accomplished by providing the rotor with an auxiliary core, which may be solid or laminated, and mounted on one side of the main rotor core. The conductors extend through both cores, and are connected by end rings of low ohmic resistance in the usual way. A third ring of high resistance may, if desired, be provided in the space between the two cores. This arrangement is illustrated in fig. 2.

Power Factor and Efficiency

With this form of construction for the reactance the iron loss is produced by a rotating magnetic field which provides approximately twice as much energy loss as would be produced by an alternating field for the same magnetic density and volume of iron. Consequently, the iron core is not so bulky as that required for the usual form of eddy-current starter, whilst in addition, the core derives the benefit of the ventilating property of the motor. Another point of importance is the lack of insulation liable to damage due to the heat generated by the eddy currents. The portion of the rotor bar which passes through the auxiliary core is insulated with micanite, and so retains a robust form of construction.

Although the power factor and efficiency are lower (due to the permanent reactance in the rotor circuit) than those of a standard machine, they are not so low as might be anticipated, as advantage is taken of the space usually available in squirrel-cage rotors to increase the section of the rotor bars without increasing the diameter of the rotor core. This reduces the value of the natural "slip," thereby keeping the frequency of the secondary current low with a corresponding small amount of reactance due to the auxiliary core at full speed.

By carefully dimensioning the size of the auxiliary core according to the conditions of service for which the motor is destined, the power component of the current in the rotor circuit can be maintained more or less constant, while the wattless component is considerably smaller than the eddy-current type starter, thereby increasing the specific starting torque.

For such duties as cranes, lifts, hoists, &c., for which a short

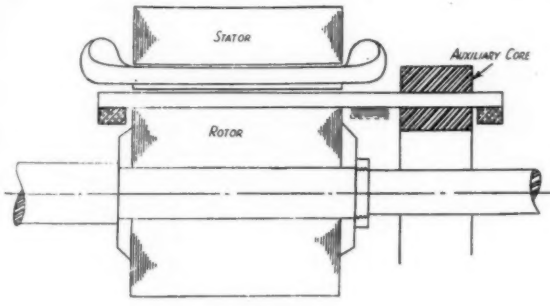


Fig. 2

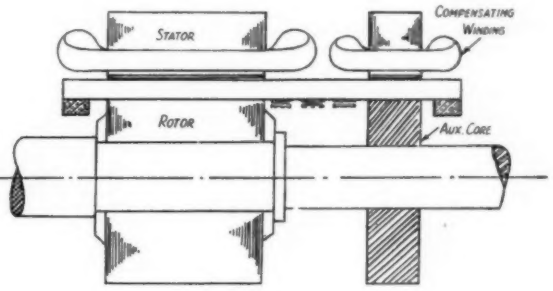


Fig. 3

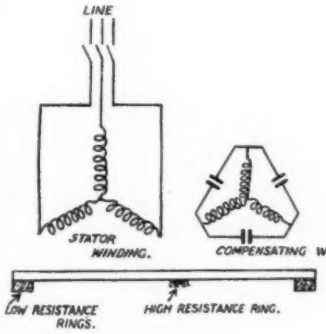


Fig. 4

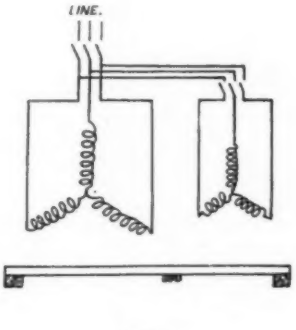


Fig. 5

rated motor is usually installed, the type of machine described possesses many desirable features, among which are high specific starting torque, smooth and rapid acceleration or retardation, efficient inherent braking action, robust mechanical construction, simple straight-on control switchgear, low initial capital outlay and low maintenance charges.

Where required, the motor can be arranged for two or more speeds in the usual manner, retaining the above features with advantage, particularly when stepping from one speed to another. The available inherent accelerating or retarding torque under these conditions is of great assistance and reduces mechanical strain on the remaining part of the equipment.

With continuously rated motors it is desirable to eliminate completely the effect of the reactance under load conditions, and so improve the power factor and efficiency. This is accomplished by dividing the auxiliary core into two parts, one member rotating with the rotor and the other fixed in the stator frame in a similar manner to the main core; this member is provided with a compensating winding.

The resulting effect (fig. 3) is like a motor provided with two stators, and two rotors on one common shaft, the actual proportion of the two units depending upon the starting torque required. The compensating winding may be connected across a condenser system or through the starting switch to the main supply as illustrated in figs. 4 and 5.

Constructed in this form, the motor is similar to that proposed by Boucherot, which, however, provided for two stators and rotors of equal dimensions, one stator being movable so as to bring about a phase displacement of 180 degrees; alternatively a phase transformer was employed to give the same effect.

In the scheme now developed the control gear merely consists of a direct-on starting switch for the combination fig. 4 (the condenser being permanently connected to the compensator winding) and two switches for the combination fig. 5, or for automatic control two contactor switches with a time relay to enable the second contactor to close at a predetermined period of time after the first one has closed.

The method of operation is to close the switch controlling the main stator winding first, enabling the motor to start, under which conditions it will exert the maximum starting torque for which it is designed. When the rotor has attained full speed, the second switch is closed and the motor runs like an ordinary squirrel-cage machine operating at the corresponding power factor and efficiency according to the load, maintaining a high overload capacity. In the condenser system, the condenser may, if desired, be of sufficient capacity to improve the overall power factor of the motor in addition to compensating for the increased secondary reactance.

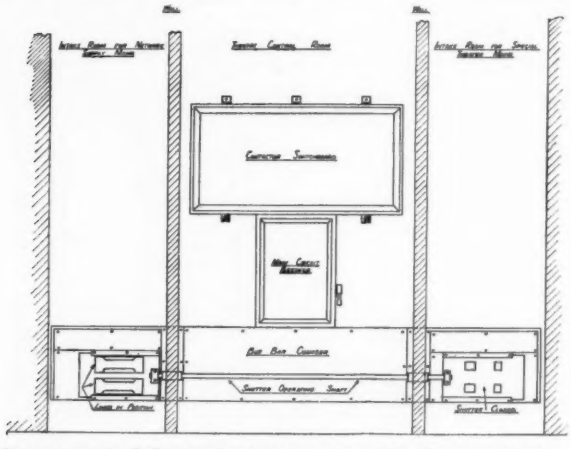
The starting condition is equivalent to a starter with an infinite number of steps and is independent of the skill of the operator or the susceptibility of the various forms of accelerating control devices embodied in automatic starters. The time of starting is proportional to the load on the motor, the latter accelerating rapidly under light loads and slowly under heavier loads; line current kicks are eliminated.

Such a machine should find a wide application, particularly for operating in inflammable atmospheres, and is claimed to combine all the advantages of the slip-ring and squirrel-cage motors without their disadvantages. The cost of this type of motor with control gear is lower than that of a slip-ring motor of the same rating with its attendant switchgear.

Electrical Equipment for Theatres

THERE are some novel features in the reconditioned electrical installation at the Duke of York's Theatre, St. Martin's Lane, W.1, which we recently inspected. The most striking of these is the apparatus used for changing over from one to the other of the alternative 200-V supplies (*i.e.*, general network and special theatre main) taken from the Charing Cross Electricity Supply Co., Ltd. It consists of a rectangular steel bus-bar case running from end to end of the service intake room and divided into three sections to correspond with three separate fireproof compartments of the room. To the bus-bars in the end sections are connected the alternative incoming cables; a further set of bus-bars in the centre compartment projects into the end sections. The central bus-bars are connected through a 500-A Statter circuit-breaker to an eight-way contactor switchboard, the connections up to that point being entirely of copper strip making a notably clean lay-out.

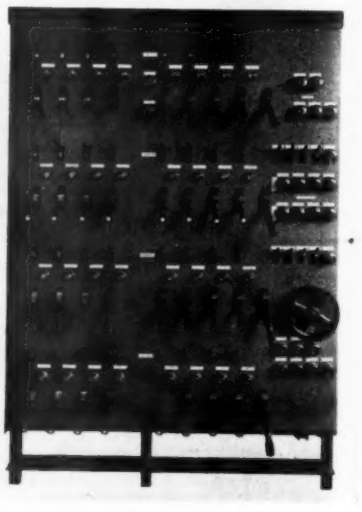
Heavy clip contacts are fitted to the ends of the bus-bars in the two end chambers to receive links for connecting either of the supply bus-bars to the installation bus-bars. Double



Arrangement of the service intake room at the Duke of York's Theatre

insulated cover plates with slotted holes corresponding to the position of the clips are provided on the face of each end section; these cover plates are fitted one over the other, that on the underside being fixed to the chamber and the upper one sliding in steel guides. The upper plates are coupled by a steel shaft, the lateral movement of which causes the two sets of holes in the plates of one end section, when in the extreme position in one direction, to coincide and admit the projecting blades of the connecting links; the two sets of holes in the other cover plates occupy different positions so that the apertures are closed.

When the connecting links are in position they lock the cover plates together and prevent the connecting rod from being moved, thus making it impossible to insert two sets of links at the same time. Auxiliary contacts are connected to the no-volt coil of the main circuit breaker; as these are energised only when the links are pressed right home, any attempt to withdraw the links when carrying current would disconnect the no-volt coil and trip the switch. Mr. S. H. Munro, the consulting engineer at whose instance Messrs. William Geipel, Ltd., produced this form of bus-bar chamber, expressed the view that the principle was capable of application to any case in which it was not desirable to parallel two cables feeding an installation.



The stage switchboard with thirty-two dimmers

Another notable feature in the theatre is the stage switchboard, also provided by Messrs. William Geipel, Ltd., which is fitted with thirty-two "Quead" dimmers of the type described in our issue of May 5th. In the present instance the dimmers are arranged in four rows corresponding to the four colours of light used; each is provided with an individual lever that can be locked to a main camshaft, one of which is provided for each colour row and controlled by a master lever. The master levers can, in turn, be locked to a slow-motion worm-wheel drive, enabling any combination of dimmers to be operated at one time.

Pilot lights indicate the colour and intensity of the light controlled by each dimmer. Geipel "Back-of-Board" switches are fitted to all dimmer circuits. One black enamelled-steel panel on the front of the board is provided for each group of dimmer, pilot light, and "Back-of-Board" switch. Rhymos, Ltd., were the main electrical contractors for the installation.

Slag Formation in Boiler Furnaces. By V. Walker, A.M.I.E.E.

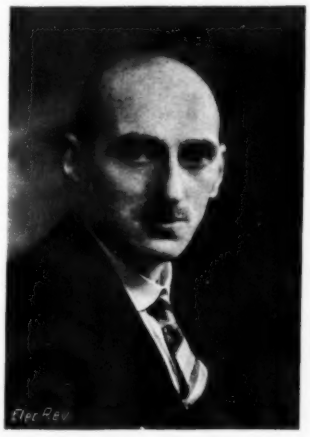
Some methods of minimising its effect

CLINKER formation or "bird nesting" on the tubes of the first pass of a water tube boiler lessens draught and heat transmission and thus reduces boiler capacity to such an extent that it eventually becomes necessary to take the unit off load.

The most common causes of slagging of boiler tubes are: (1) Running the boiler at high capacity over long periods; (2) using coal having a high ash and low fusion point; (3) using a low proportion of excess air; (4) high air temperatures. The effect of these conditions is to raise the furnace temperature so that the fly-ash particles become plastic and adhere to one another forming "bird nesting" at temperatures that are related to the fusion point of the ash and to its iron and unburnt sulphur content.

The fly-ash particles consist principally of silica coated with a fusible skin of silicate of soda (due to the sodium oxide in the ash), which at furnace temperatures is very sticky. Sodium oxide also unites with the sulphuric acid produced by combustion, forming sodium sulphate, which is deposited in the front boiler tubes as a white powder. A portion of this sodium sulphate is swept along with the flue dust and deposited in the cooler parts of the boiler. This deposit is acid, as the sulphuric acid is in excess of the soda; it is also hygroscopic, and active corrosion will occur if there are leaking headers. The slag deposited on the tubes is not corrosive, but the sulphate of soda leads to the tube metal overheating through internal scale formation. Sulphate of soda melts at a temperature of approximately 1700 deg. F., giving up oxygen to the iron and converting it to scale oxide, forming a scab on the tube surface.

Slagging was prevalent in the first powdered-fuel furnaces, as high temperatures were obtained and the combustion chambers were shallow and restricted, the ash having in many cases to be removed as slag with the aid of sledges and bars. Furnaces were later made of a depth that allowed the ash to be chilled and dried before reaching the base, and were provided with water screens and walls, which help to cool the ash and prevent slagging.



Mr. Vernon Walker is in the Bury Corporation Electricity Department

The Principal Causes

With pulverised fuel the principal causes of slagging are: (a) Burners giving insufficient combustion; (b) high percentage of coarse coal from the mills; (c) high furnace heat liberation, and (d) low fusion temperature of the ash. To these can be added incorrect flame travel and velocity; for if the velocity of the flame from the burners is low there may be a tendency for the gases to escape from the furnace before combustion is complete, causing combustion to be continued in the first and superheater passes. A higher primary air pressure will result in a corresponding increase in flame velocity and travel, but the flames must not be thrown down on to the furnace bottom or water screen to cause subsequent slagging there. The size of the coal particles is important, because of two particles having the same fusion temperature the larger remains sticky while the small radiates heat as it approaches the boiler tubes and is cooled below the point of plasticity by the time it strikes them; it then rebounds and is carried forward between the tubes.

Slagging is also found with stoker-fired plant, especially if the furnace space is limited in an endeavour to obtain the highest possible evaporation from the least possible space; as the front generating tubes may be shaded by arches, a point will be reached where the heat absorption rate will not keep the fly-ash particles below the point of plasticity.

In some furnace designs a throat is provided which thoroughly mixes the gases as they leave the furnace by increasing their velocity; this often causes slag formation, as the velocity and temperature of the gases are high on reaching the tubes. The temperature of the gases must be lowered before they come in contact with the heating surface to a level below that at which the ash particles are plastic so as to secure the minimum rate of slag formation. The amount of radiant heating surface and its location in the furnace will decide the temperature drop between the grate and the first row of tubes; the heat absorbed being inversely proportional to the square of the distance and directly proportional to the amount of area exposed.

Smooth bare metal-faced blocks attached to the water walls are used in upper positions of hopper-type furnaces of powdered-fuel boilers to cool the gases as they enter the tubes, and slag does not adhere to this construction. Refractory faced blocks are in use for the combustion zone of the furnace; in some cases the block is of rough-surfaced metal designed in such a way that it collects and maintains its own refractory facing of slag.

Boiler baffling will also materially affect the slagging, the velocity of the gases at the entrance to the first bank being often excessive. Radiant heat superheaters placed between the first section of tubes may also add trouble. In order to maintain a constant furnace temperature the amount of excess air is increased with the boiler output, especially with refractory walls. With water walls furnace temperature changes are of minor importance. Such furnaces are very often run to the limit of capacity, which causes severe slagging of the boiler tubes, but an increase in excess air may be found to overcome the difficulty.

Methods of Removing Slag

An accumulation of ash in the ash pits may also increase slagging trouble as the temperature of the pit rises. The removal of slag from the boiler tubes can be accomplished by fitting extra soot blowers; some of these are specially designed for lancing the front tubes, the nozzles being drawn back after operation into the furnace wall where they are protected from the heat.

Manual blowing can be carried out by steam or compressed air lances, small doors being arranged to give easy access to all tubes. In some cross-drum boilers the front headers are flattened across the lower row and special doors provided in the front casing for the insertion of a hand lance When the boiler is banked, the tubes can be cleaned by means of a water spray, and the slag being brittle is easily broken loose. The slag and ash that arch over the ash pit or on the ash-pit slopes can sometimes also be removed by using the water lance.

When the boilers are taken out for cleaning the lower tubes should be thoroughly cleaned by hand scraping. Hard baked ash can be removed by spraying first with warm water and afterwards cleaning by means of scrapers. In order to make the velocity of the gases entering the first bank more gradual the fire tubes are often pitched wider apart to form a slag screen. Simply removing a number of tubes in the front row apparently has no great effect on slagging.

An interesting development in slag screens has been made on one of the large cross-drum boilers at the State Line Station in Chicago. The screen is constructed of two staggered rows of tubes on 12-in. centres situated well in front of the lower bank of boiler tubes. Each tube in the furnace has a series of closely spaced studs welded to it and is covered with refractory to an outside diameter of 5 in. The screen shields the boiler tubes from direct radiation and the slag and ash that pass through the screen are cooler and less sticky. The ash on the screen is also plastic, the furnace being run at a high temperature, and this has a "fly-paper" effect on the ash particles.

Ash Disposal

Should the furnace temperature be higher than the fusion point, the ash can be tapped as molten slag, a method of removal that has been widely adopted in the U.S.A.; lower carbon loss in the ash is claimed and the ash handling, usually by means of water, is simple and clean. There are several ways of building up the bottoms of slag tap furnaces. The floor is generally supported on a steel plate and this is covered with three or four courses of firebrick and afterwards covered with either dolomite or mica schist or magnesite; layers of granular slag, coke, or coke breeze are then placed on top of this.

With ash having a fusion temperature between 2,100 deg. and 2,500 deg. F. there appears to be no difficulty in starting the slag to flow. The slag spout is often water-cooled, and auxiliary burners are located on either side of it at such an angle that the flame plays on the hot bottom near the mouth of the spout and assists in keeping the slag sufficiently liquid

Sir William Ray, M.P., L.C.C.

His unanimous appointment as Executive Chairman of E.D.A.

AFTER making an exhaustive examination of the qualifications of a number of well-known gentlemen, the Council of the British Electrical Development Association has appointed Sir William Ray, M.P., L.C.C., to be its Executive Chairman. The Association therefore has a President, Lord Ashfield; a Chairman of Council, Mr. H. C. Lamb; and an Executive Chairman, Sir Wm. Ray; with Mr. A. C. Cramb as Director and Secretary. The constitution of the Council and the names of the gentlemen forming it are matters with which most of our readers are already familiar.

The announcement of the appointment of the new Executive Chairman was made officially by Mr. Lamb on Friday last at the Savoy Hotel when the technical Press editors took luncheon with the Council.

So much has been written concerning the greater work that lies before the reorganised E.D.A. that it may be supposed by some that the making of this appointment is a signal that the country will be plunged immediately into the much-needed campaign. This, however, is not to be the case. As we hinted in our leaderette pages last week, funds have to be obtained and an enlarged staff engaged before these things can be possible though the "Wizard in the Wall" advertising scheme is developing.

[*Lafayette*

Sir William Ray, the new executive chairman of the Electrical Development Association

Mr. Lamb's Views

As Mr. Lamb stated on Friday last, the most urgent work that lies before the Association is securing subscribers on the standard basis. He also intimated that certain events had transpired in some areas which had led to the municipal undertakings in those places being hampered in their own publicity and propaganda operations, thus rendering them more dependent than ever upon the Association.

Mr. Lamb paid a cordial tribute to Mr. Cramb and his assistants for having rendered the most valuable service that men could give to the Association—they had been thoroughly immersed in its business from early morning until late at night. Nothing more could be expected from them; the organisation must be strengthened by bringing in someone able to take the broadest possible view of its activities. The Council had been looking for a suitable person and had found him in Sir William Ray, and he would be their Executive Chairman.

Their decision was unanimous. Sir William had been an active personality in the municipal life of London for a great many years. He became something of a national figure when he was appointed by the Chancellor of the Exchequer to be chairman of the committee set up to consider the question of local expenditure. He had made a name for himself in Parliament as member for Richmond. For twenty-one years he had been a member of the London County Council and for eight years leader of that body; and previously he was prominent on the Hackney Borough Council in close connection with the Electricity Committee. Sir William Ray would not be able to devote his whole time to the service of E.D.A. until the beginning of next March.

The New Chief

Sir William Ray said he was proud of the fact that the appointment was unanimous. He laid no claim to being a technician. He had had a very wide experience in social matters and big organisation affairs. The intercourse side of E.D.A.'s work was similar to what he had been doing for thirty years. For a month or two he would devote his attention to learning the ropes. He would not sit down with a few papers in an office and study their organisation in that way. During the next few weeks or so he would go from one end of the country to the other visiting all the E.D.A. localities, for it would be invaluable to him to be able to get into personal contact with the industry in many places remote from London. Sir Wm. Ray intimated that he would regard his new duties as his life's work.

Sir William Ray is fifty-seven years of age. He was born and educated in Lancaster. As his knowledge of electrical affairs grows, the fact that he holds a seat in the House of Commons may enable him to render much-needed Parliamentary assistance to the electrical industry from time to time. At first, of course, he will carry out the decisions of the Council and advance proposals on his personal initiative.

* * *

SIR WILLIAM RAY takes up his new office without any electrical reputation to handicap or to help him. He is, on the other hand, a man of very extensive knowledge of, and experience with, public authorities. On these two points it is appropriate to comment just now.

First, then, let it be remarked that most men who have grown up into the high places in the electrical profession and industry have done so because they have become specialists in their own department or departments, and because they have possessed a personality which has made them acceptable. It may be that some of the candidates for the executive chairmanship have been under the suspicion of holding pronounced ideas or of being wedded to particular policies which might hamper them in a new office where those ideas and policies were not generally approved. They may have been regarded as unsuitable for this very reason.

Sir William has had no connection with any section. Neither by past experience nor by connections, or, as far as we are aware, by utterance, has he any natural or pledged allegiance to any one section of the electricity supply industry.

From some standpoints an entirely non-electrical appointment may seem to possess disadvantages, but the above important fact has to be put into the scale against his want of knowledge of an industry in which the most difficult problems have for years past persisted almost to the point of desperation. He has been chosen by representatives of all sections in that industry—the Central Board, the municipalities, the power companies, the supply companies and the joint authorities—and these may all be expected to facilitate the carrying out of his efforts to achieve the end which we all desire, namely, a greatly accelerated rate of electrical development under the national scheme.

Sir William has assured the staff that he is an easy man to get on with, and we have no doubt that, under the Council, he will soon find ways of securing their cordial co-operation, for he will naturally require to draw generously upon the wide experience which they possess of the multitudinous different classes of propaganda, publicity, exhibition, committee, and other work that has been and still is to be done. It has to be remembered that the old E.D.A. has not been scrapped—it is being reorganised as common sense dictates in such a way as to retain all the good that is in it. Possibly there may be room for some simplification—some things may be dropped and others that have had to be neglected may receive greater attention as the staff of the Association reaches more reasonable dimensions.

The second point—Sir William's qualifications in the field of public authorities and public relations—will be, in our opinion, an extremely important one. And if the new Executive Chairman proves to be the right man for the job he will be found to carry weight with municipal, and we hope company, authorities who have not so far seen fit, or been allowed, to back up the Association with financial support. Here there is unquestionably need for a strong and specialised service; he will find room for tact, experience, personality, and enthusiasm.

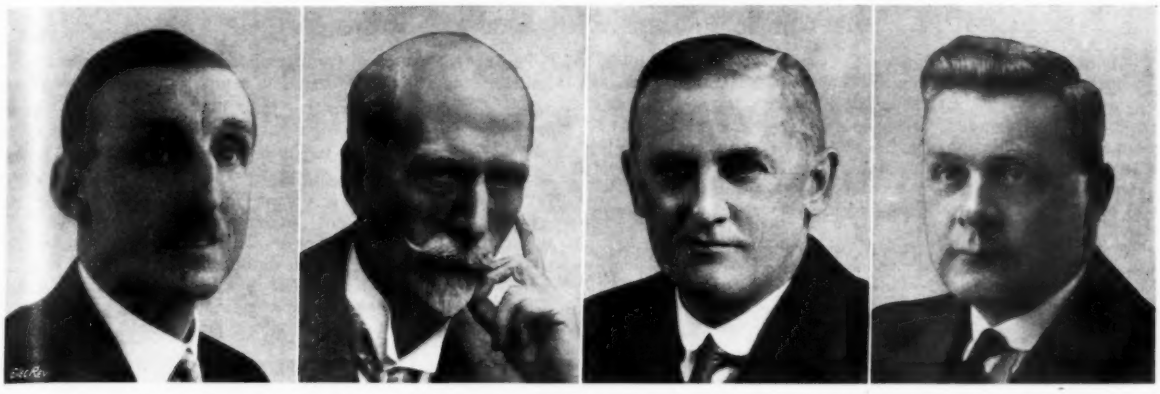
Slag Formation in Boiler Furnaces *(continued from preceding page)*

to flow out of the spout readily at low loads; the bottoms are cooled by air or water tubes.

Compressed air is discharged through a perforated pipe into the aggregate and led by passages into the side wall where it is discharged into the furnaces, which have refractory-faced water walls; the use of completely water-cooled bare-tube furnaces have also been successful. The thick solid slabs of slag tend to exert considerable lateral pressure against the side of the furnace as the bed expands and contracts and the water walls have been forced outwards as much as 2 in. in some cases.

Slag-tap furnaces are fired by burners situated directly above the pit, and arranged for opposed firing in certain cases, or they can be fired by vertical burners which will probably give a wider range of ash fusing temperatures and greater ash recovery with a reduced boiler tube slagging.

Some Municipal Electrical Engineers

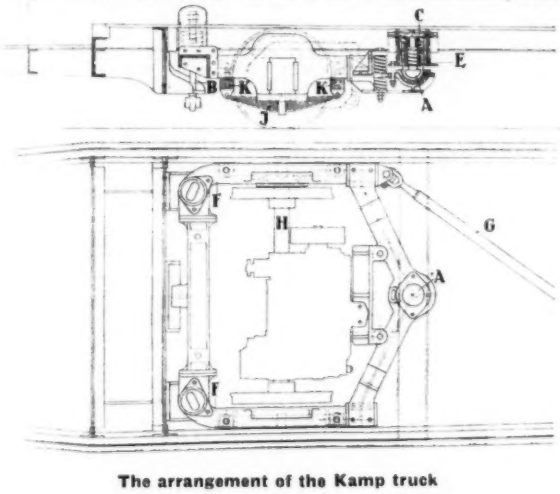


From left to right: Mr. H. H. Parker (*Jerome*), Pudsey; Mr. E. F. J. Holcombe Hewlett (*Lafayette*), Mansfield; Mr. E. A. Mills (*Lafayette*), Halifax; and Mr. J. C. Macfarlane, Portrush, Northern Ireland.

A New Radial Tramcar Truck

Overcoming resistance on curves

THE carrying capacity of double-bogie vehicles can usually be increased (but only within very narrow limits in the case of four-wheeled rolling stock), by extending the length of the coach body. Even if other considerations, such



The arrangement of the Kamp truck

as axle load and motor power, permit of substantially greater carrying capacities, sharp curves call for a short rigid wheelbase with a correspondingly large overhang of the car ends. Both factors affect adversely the riding qualities and the mechanical rigidity of the vehicle, besides causing premature destruction of the track.

Spring-controlled swivelling axles permitting of radial adjustment and flexibility on curves have not been entirely successful on the whole, since the angle formed between the flange and the left-hand front wheel and the tangent of the outer rail is even greater than with rigid axles. This increases the risk of derailment and causes a higher tractive resistance with a correspondingly greater load on the driving motors.

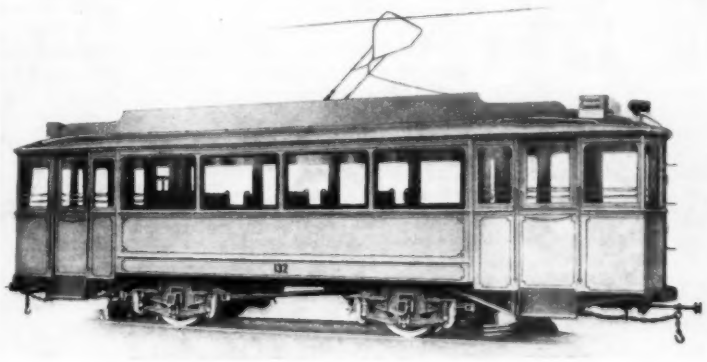
A solution of the problem is provided by a radial truck which permits of the adoption of comparatively long total wheelbases and the correct radial adjustment of *both* axles in accordance with the curvature of the track.

The Kamp single-axle radial truck has been adopted for many cars built by the Wismar Carriage Works (EVA) of Mecklenburgh. Referring to the drawing, the truck consists essentially of a substantial frame F, carrying a single axle H and hinged to a cross-member C of the carriage underframe by means of a spherical pivot A, the weight of the superstructure being transmitted by the helical spring E. The opposite (outer) end of the truck supports the underframe by means of spring-controlled swing links B, which effect the return of the radial truck into the neutral axis.

This truck absorbs road shocks due to rail joints or uneven track almost directly at their source. Since each truck supports its car end at three points, the coach structure is kept free from flexing stresses caused by distortions of the chassis. The springing of the truck is by means of leaf springs assisted by auxiliary helical springs in the usual manner. The rear axle of a rail vehicle adjusts itself to the curvature of the track almost spontaneously, but to obtain a correct radial position of the front axle also, the two trucks are coupled by a suitable rod G hinged to opposite inner ends of the truck frames and running diagonally beneath the coach structure. This rod also prevents oscillatory movements of the trucks on straight track.

The radial truck is less complicated and lighter than the bogie type, which, with a two-motor equipment, prevents the use of the entire weight of the vehicle for adhesion. The four-wheeled car is cheaper, since only half the number of wheels, axles, axle boxes, and springs are required. The riding qualities of a tramcar fitted with single-axle radial trucks of 11 ft. 10 in. wheelbase and travelling at 21 m.p.h., are said to compare favourably with those of a vehicle having a rigid wheelbase of 7 ft. 10 in. running at a speed of less than 20 miles per hour.

The radial truck, complete with the traction motor and reduction gear, can be readily withdrawn from the vehicle for repair or overhaul, and by providing a spare truck a car can be kept in almost continuous service. The inertia forces acting upon it are low owing to its comparatively small mass, and this is claimed to reduce the cost of maintenance by about 20 per cent. of that of a car having a rigid wheelbase. Its adaptability to track curvatures results in a substantial reduction in the tractive resistance on curves which is said to give



A Belgian tramcar employing a pair of the trucks

a saving of up to 15 per cent. in energy consumption. The accompanying illustration shows a pair of Kamp trucks as installed in a car of the East-West Tramway of Liége, Belgium.

A single-axle radial truck of lighter construction has been developed for trailer cars.—RODERICK HEDLEY.

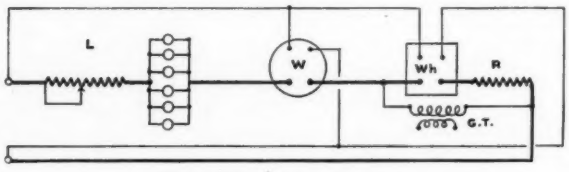
Testing Heavy Current A.C. Meters. By G. W. Stubbings

A simple method with several advantages

IT is generally held by meter engineers that a.c. meters with current transformers should be tested with currents corresponding to their rating, and with their transformers; this practice is not regarded merely as a counsel of perfection, but as one which should be normally adopted in test departments whose work attains to a reasonable standard. The alternative to this method of testing is to deal with the meter separately, and allow for the current transformer errors which are presumed to be known.

The testing of meters without their transformers is in itself easily and conveniently carried out, as the test loads are small and readily handled. When silicon-iron current transformers are used with the meter, it is not easy to make proper allowance for their errors, as these are not only considerable but vary greatly with the load. The testing of three-phase heavy-current meters with their transformers, on the other hand, calls for a fairly elaborate equipment, and the test loads are difficult to manipulate, especially if, as is customary, it is desired to keep these loads approximately balanced.

Further, while the testing of a meter without transformers requires wattmeters of low current rating, which can be ob-



A meter-testing arrangement

L loading resistance; W wattmeter; Wh watt-hour meter; C.T. current transformer; R resistance corresponding to internal burden of C.T.

tained with a high degree of accuracy, the measurement of heavy current loads either requires an expensive total current wattmeter, or entails the use of standardised current transformers for the measuring instruments, and thus introduces the very complication which this method of testing is intended to avoid.

The development of the nickel-iron current transformer for consumers' meters considerably modifies the advisability of the heavy-current test. The ratio errors of modern metering current transformers are so small that they can almost be neglected. At all events they can be allowed for in assessing the overall error of the meter combination with non-inductive loads. The chief difficulty in properly adjusting and testing meters without their transformers is usually supposed to be that of securing accurate registration on low power factors. The phase accuracy of modern transformers is very low, but the phase error will have an appreciable effect on the meter registration at power factors of 0.5 on which meters are usually tested.

This effect is readily calculated, and the percentage error of the meter combination which is due to the phase error of the transformers is $\sqrt{3}\alpha$ where α is the phase error expressed as a percentage of a radian. Thus the phase error will make the meter register $\sqrt{3}\alpha$ per cent. faster on 0.5 power factor lagging, and $\sqrt{3}\alpha$ slower on 9.5 power factor leading. If, for example, the phase error of the transformers is ten minutes, or 0.3 per cent. radian, the overall difference in registration due to this error between the lagging and leading power factors will be approximately 1 per cent. This error can, therefore, be allowed for in adjusting the meter when tested alone, by making the registration at a power factor of 0.5 lagging 1 per cent. slower than that at the same power factor leading.

A Simple Test Method

An even simpler and more accurate method of testing meters with small currents is that indicated in the diagram, a single-phase instrument being shown for the sake of simplicity. It will be seen that the current coil of the meter is connected in series with a resistance R, whose ohmic value is equal to that of the secondary of the transformer with which the meter will be used. The secondary of this transformer with its primary open circuited is connected in shunt to this series circuit. For any test load, the voltage across the transformer terminals will be approximately the same as its internal e.m.f. when supplying the meter, and carrying in its primary circuit a current corresponding to the value of the test current. The magnitude and phase of the current in the meter coil will, therefore, be modified by an amount equal to that applicable to the corresponding primary current.

Provided two conditions are satisfied, this method of testing gives a very accurate equivalent to the heavy current test. These conditions are first that the reactance of the secondary circuit of the current transformer secondary is negligible, and that the total internal burden corresponds closely to the secondary resistance, and secondly that the turns ratio is the same as the nominal ratio. Bar primary transformers with circular cores satisfy the first condition very closely. Identity of turns ratio and nominal ratio is usually found with nickel-iron current transformers, as the ratio errors are so small that turns compensation is not necessary.

The advantages of the method of testing heavy-current meters alone are so considerable that these may conveniently be recapitulated in justification of the recommendation of this method: (1) wattmeters of high accuracy are obtainable at moderate cost; (2) test circuits are simple and can readily be manipulated; (3) artificial power factors of definite values can easily be obtained; and (4), there need be no indefinite phase shift between the test current and voltage, such as is unavoidable when transformers with heavy-current secondaries are used on short-circuit for the purpose of supplying artificial test loads.

A New Multi-purpose Instrument

THE "crossed shadow" instrument described by P. M. Pflier in a recent issue of *Elektrotechnische Zeitschrift* employs two or more movements A, fig. 1, with pointers crossing in the path of light rays from a focus lamp. A condenser B and objective C project shadows of the pointers on to an opal sheet D, which can be calibrated to read four quantities according to the actual and relative positions of the shadows and their intersection. The advantage of vectorial representation is added to that of numerical indication. The vector sum of two quantities as well as their ratio can therefore be read directly, in addition to the individual values of the quantities themselves.

If the instrument is to be used for the measurement of true and reactive power, apparent power and power factor, its zero is at the centre of the "scale." True power being measured on the horizontal diameter (delivered to the right, absorbed to the left), wattless power is measured on the vertical diameter (positive upwards, negative downwards from the centre). The radius of the circle through the intersection of the shadows indicates the apparent power at any time; and the circumferential scale indicates the corresponding power factor. In the case represented by fig. 2, true power=2 kW; reactive power=6 kW; apparent power=6.3 kVA; power factor=0.32 leading; effective power is being absorbed and capacitative wattless power delivered.

By placing the scale in the plane of the pointers and projecting it optically, errors in setting can be avoided, and the size of the visible scale can be varied easily. Other applications of the instrument include the use of three movements and pointers to show the phase and voltages and symmetry of a three-phase system, by the movement of a delta shadow relative to a star scale; and a double and null voltmeter arrangement, with reed frequency meters alongside the voltage scales, for use in synchronising.

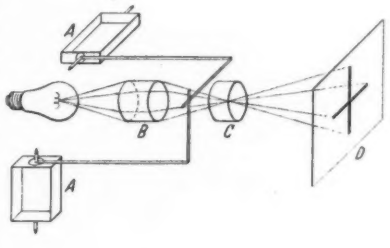


Fig. 1

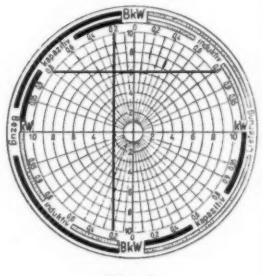


Fig. 2

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The Present Position of Cable Manufacture

THE inaugural address of Mr. P. V. Hunter, C.B.E., the new president of the INSTITUTION OF ELECTRICAL ENGINEERS in London on October 26th was prefaced with comments on the widening scope of the engineer's activities. Mr. Hunter said that the exclusively practical man had been succeeded by a type which combined theoretical knowledge with practical experience, and, ultimately, as the technical side was subjected to control, there was evolved the modern engineer whose outlook was primarily economic.

There had been suggestions that the pendulum had swung too far and there was an inclination to attribute the industrial slump to excessive economic efficiency. It was now being appreciated, however, that the major problem was the correct regulation of output to meet demand.

In any industry the output of which was regulated and in which prices and wages were the same for all, those producers prospered most who worked with the highest economic efficiency. From being the most independent and uncontrolled bodies in the world, the Industrial Recovery Act had now made American manufacturers the most restricted and regulated. German industry appeared to be undergoing a somewhat similar process, and economists seemed to favour the new system strongly.

At first sight it might appear that there was very little corresponding movement in this country; but it was characteristic of Great Britain to arrive unconsciously at practical solutions of problems, such solutions being later found to embody important and far-reaching principles. Such organisations as the B.E.A.M.A., the E.L.M.A., and the C.M.A. were, in fact, somewhat in danger of acquiring a halo by virtue of their having been, for many years, voluntary champions of the true faith while the world was following false prophets.

Under the Central Board the electricity supply industry was at last travelling in the right direction, but there was some difference of opinion about the best means of rapidly increasing the output of the grid. In the past supply authorities incurred capital expenditure of a wasteful nature in building small and uneconomical generating stations. But there was no wastefulness of this kind in distribution and it was difficult to show that the present method had resulted in any appreciable addition to the cost of electricity.

The situation was entirely different, but this was, of course, no argument against the consolidation of distribution areas. Concentration on selling campaigns and publicity was of the utmost importance. If the absorption of the smaller undertakings by the larger could be secured by agreement without weakening this effort, so much the better. If legislation became necessary, great care must be exercised to avoid introducing serious discord at the present critical time

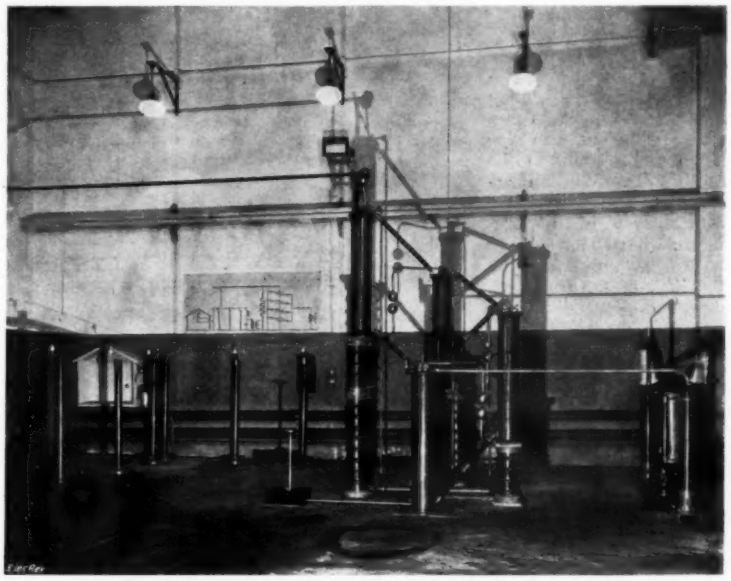
Cables for Rural Distribution

The second part of the paper dealt with cable progress. Mr. Hunter said that consideration of present British practice relative to solid impregnated paper cable, which was now used for voltages up to and including 66 kV three-phase, indicated the superior performance of the screened type as compared with the belted type. Working trials had indicated that there was a margin for economy obtainable in the lower-voltage cables by so reducing the thickness of dielectric as to give the same working stresses as in the higher-voltage cables. But even a substantial reduction of the dielectric thickness had but a small effect when expressed as a percentage of the total cost of the laid cable.

There were, however, conditions under which an economy in cable manufacture would be of considerable economic value, namely, in the case of 11-kV cables for rural distribution laid across country. Under these conditions the cost of the trench work could be kept much lower, and the economies in the cost of the cable itself represented a higher proportion of the total cost. Engineers had been reluctant to run cables across country in the same way as they did overhead lines. There was, however, no real objection to such methods. The cable was less liable to interference, and less costly to maintain than when laid in public roads.

It should also be possible to standardise a universal type of rural cable for 11-kV working, of fixed conductor size and special design, working at the stresses permitted in supervoltage cables. If this were done not only would the cable be instrinsically cheaper to manufacture but economy would result in many directions.

In Holland there had existed for many years a policy of development of rural areas by means of 10,000-V underground cables; the amount which had been laid exceeded 10,000 miles, throughout the country, and was in no sense limited to particular areas. The annual cost of repairs and maintenance was less than one-half of 1 per cent. of the original capital cost, and was not a growing proportion.



The new e.h.p. testing plant at Delle, France. **(See page 644)**

In view of the advantages as regarded amenities, reliability, and general convenience associated with the use of underground cables, a special effort should be made to employ them in rural areas in this country.

Oil-filled and Gas-pressure Types

So far as the ordinary solid impregnated-paper cable was concerned there had been great improvements as a result of studying the effect of varying the paper and impregnating compounds and of changed methods of impregnation. For this type of cable, therefore, the limit had probably been nearly reached.

It was not possible to make cable dielectrics exclusively of either gases or oils under compression; but, using paper as a supporting medium, both methods had been under investigation by a number of workers. Makers had successfully evolved a comparatively cheap wood-pulp paper of which the breaking strain was 18,000 lb. per sq. in., thereby rendering it more economic than a non-ferrous metal. There was no objection to the use of paper when it was enclosed and hermetically sealed in the annular space between two lead sheaths; and, from the point of view of ease of handling and mechanical considerations generally, paper was preferable to metal tapes which, in order to make them workable, had to be enclosed in a bedding of some softer material. It was possible to obtain an increase of from 200 to 300 per cent. in the electrical breakdown strength by raising the compression of the gas used as a filling medium. By selection of the thickness and density of the paper used, a further considerable increase in strength was obtainable.

The discriminating utilisation of these phenomena clearly offered the possibility of producing cables of economical dimensions for the highest voltages. It was, in fact, doubtful whether breakdown strength would remain the determining factor for the thickness of the dielectric, since at high voltages the use of a very thin dielectric would give rise to a large capacity current, notwithstanding the fact that the gas-pressure cable had a lower specific inductive capacity than the ordinary impregnated cable.

There were a large number of possible variants; in fact the difficulty appeared to lie in correctly estimating the effect of a

number of variables so as to arrive at the best economic design of cable. It seemed probable that the resultant cable would require some measure of compensation for capacity current, when operating with alternating voltages of 132 kV and higher. The most convenient method was to increase the magnetising current of the step-down transformers, as this was cheaper than to provide special reactance equipment. Indeed, once they were available, the whole question of the best method of employing such cables would require careful investigation, as there was little doubt that direct current at a very high voltage had every prospect of considerable economic advantage over other systems.

Public Services Need Co-ordinating

IN his presidential address to the INSTITUTION OF MECHANICAL ENGINEERS in London on October 27th, Mr. Alan E. L. Chorlton, C.B.E., M.P., suggests that the need for co-ordinating and improving the several public services is urgent, if the general facilities for industry and the amenities of social life are to be increased and waste is to be minimised.

Mr. Alan Chorlton, C.B.E., M.P.

Increasing industrial activity with corresponding growth of population in the south suggests possible redundancy in the north and scarcity in the south. Mr. Chorlton accordingly advocates the construction of national interlinking water and gas networks somewhat on the lines of the electricity grid and controlled in a similar manner, but with this difference. The extra supply of gas at low cost would come not from newly erected gasworks but from coke-oven installations, either existing or now being erected at the pit-heads of various collieries, from which gas is at present blowing to waste. The general development of coal-mining points clearly to the considerable increase in the number of these installations, and accordingly the gas grid system would have, the author maintains, a great advantage over the electrical, both from a capital and an economic point of view.

As an example of inter-working, the president suggests: (*a*) Electrically driven pumps for the water grid, operating during periods of least demand to obtain the lowest possible rate for current; (*b*) gas-engine driven pumps in the coke-oven areas for the water grid; (*c*) electrically driven pumping for gas on a similar basis; (*d*) gas-engine driven electric generating stations using cheap gas from storage as the supply for peak electrical loads; (*e*) water storage systems to act through turbines on electricity supply systems; (*f*) the foregoing combined with water-supply systems in some cases.

What is being achieved by electricity affords a powerful stimulus to prosecute with despatch schemes for water and gas, while the development of the sewage and drainage systems of the country should promptly follow that of a general water supply.

Railway Electrification

In transport there is already a considerable development of the modern trend of co-ordinated and centralised control, and the extension of this principle will continue. The development of waterways, examples of which are the Grand Union now in progress, and the Nottingham-Humber scheme practically completed, indicates that the long neglect of this important system of transport is coming to an end.

But a far more important question is that of the electrification of suburban railways. The industrial areas of South Lancashire and the West Riding of Yorkshire, densely populated as they are, and threaded by a close network of railways, are particularly suitable for such a development. It would result in much work for many trades, and a great improvement in travelling and transport facilities. There are many other schemes of national re-equipment which might with advantage be undertaken; all must bear their due relation one to the other and to the whole, and in each the mechanical engineer can play a great part.

Inequitable Rating

OUTSPOKEN criticism of the method of rating electricity undertakings was voiced by Mr. J. N. Waite, city electrical engineer, Hull, in his inaugural address as chairman of the North Midland Centre of the INSTITUTION OF ELECTRICAL ENGINEERS at Leeds on October 24th. He pointed out that (1) based on capital expenditure, the highest rated undertaking paid twenty-nine times as much as the lowest rated; (2) based on gross income, the highest rated undertaking paid thirty-nine times as much as the lowest rated; (3) based on pence per kWh sold, the highest rated undertaking paid eighty-three times as much as the lowest rated, and, in addition, paid more than twice as much in rates as it paid for coal—the raw material of the industry.

For the year 1927-28, the public electricity undertakings paid in rates an amount equal to 38 per cent. of the total cost of fuel. For the year 1930-31, rates had risen to 59 per cent. of the fuel bill, and there appeared to be good grounds for believing that the quinquennial reassessment due this year would result in a further general increase in assessments. What other industry could show examples of local taxation amounting to 3.5 per cent. of total capital, 15.7 per cent. of total income, and more than twice as much as the raw material used?

He arrived at the following main conclusions: (1) That taxation should normally be levied proportionately to income; (2) that the great majority of the expenditure for which local rates were raised was for the national good, and should be raised by national taxation; (3) that the present method of assessment for local taxation was inadequate and inequitable, and did not conform with the first cardinal principle of taxation; (4) that the only logical and equitable method of assessment, both local and national (if it were necessary to separate them) must be applied direct to the private income of individuals. In other words, industry as such would be relieved of all normal direct taxation, but the profits of industry would be taxed when distributed to individuals, or when set aside for the benefit of individuals, and the tax levied would be proportional to the income of the individual taxed.

Power Station Auxiliary Drives

THE paper on the electrical drive and control of power station auxiliaries by Mr. J. W. A. Abernethy, which was referred to last week, was discussed by the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on October 24th. Mr. J. R. Cowie, chairman of the group, said that the author's graphs and figures comparing methods of control were something which the industry had been trying to obtain for a long time.

Mr. A. W. Nunn suggested that if a forced draught fan motor was left running at constant speed, the inlet air could be controlled by a revolving ring with shaped vanes so that the fan efficiency could be maintained at a more or less even figure throughout the whole capacity range. Mr. J. K. Shepard thought that any form of damper circulation was expensive. He recommended hydraulic coupling, which gave an infinite regulation, enabled the motor to be started with minimum starting torque, and made it possible to adopt a single squirrel-cage motor, which also had the effect of reducing the price very considerably.

Mr. Speed contended that reliability was more important than technical efficiency and for that reason he favoured a few steam-driven auxiliaries. Mr. W. J. Oswald stressed the fact that the rupturing capacity of switches for auxiliary motors was becoming more important, as the result of connecting existing auxiliaries to the grid. As chairman of the Parliamentary Committee of the Association he had been brought into touch with the case of a shift engineer who started a circulating water pump motor which was supplied at 3,300 V, unaware that there was some fault on the motor. He switched on to what was a "dead short," the motor was blown to pieces, and the engineer was seriously injured. Litigation followed, in which the Association took part, and was able to obtain for that particular man a fairly large amount of compensation for the injuries he had received.

Mr. E. Laming said that there were some steam-driven auxiliaries in the installation with which he was connected; they had got the station started up in the morning on more than one occasion, and he was convinced that they would do so on many more. Mr. M. F. Allsop disliked the way in which the main contractor sub-let the auxiliaries to another firm, and left the customer to "hold the baby." Mr. W. V. Cooper suggested that the three items to be considered, in their order of importance, were reliability, efficiency, and capital expenditure. Electrically driven auxiliaries constituted a long chain of weak links, and there was from this point of view a great deal to be said for locking auxiliary motors solid on to the supply bus-bars as was now done in some cases.

Mr. Young expressed the view that the time would come

when d.c. motors would be used for central station auxiliaries. A big modern boiler plant needed motors aggregating 2,500 h.p., and the Ward-Leonard system would be adopted to give infinitely variable speed. Mr. Ream disagreed with the author's suggestion that the fan-cooled motor was more dangerous for boiler-house work than the drip-proof type, because the fan-cooled type gave a warning when the air ducts began to choke.

The vane-propelled type of fan was a good proposition in the case of induced draught plant; when used with a two-speed squirrel-cage motor running at low speed with normal loads the efficiency was about 10 per cent. more than with hydraulic coupling. This arrangement was quite simple, provided there was remote control, and it had replaced some early pneumatic gear in his undertaking.

Mr. A. G. Hilling drew attention to the exceptionally severe short-circuit currents possible, and suggested artificial impedance for power station control gear, *i.e.*, putting a reactor in series with the house service transformer. Placing induced draught-fan motors on the top of a boiler house, which might be over 100 ft. high, was a serious proposition and involved considerable cost for cables if a 500-h.p. d.c. motor were used. Therefore, there was much to be said for a.c. in such a case. Mr. G. M. S. Sichel commented upon the tendency of control gear to become too complicated, and he put forward a strong plea for simplicity in remote control gear. Mr. J. P. Morley contended that 99½ per cent. of motors used for auxiliary work in power stations had inadequate cable connections. Very rarely indeed was the cabling considered in sufficient detail beforehand.

Mr. H. M. Travers said that in one instance the auxiliary plant motors required aggregated 15,000 h.p. of varying sizes from 1 h.p. to 500 h.p. Undoubtedly, therefore, reliability was the most important item and he maintained that the most reliable piece of electrical apparatus in the industry was the squirrel-cage motor, for which there was a great deal to be said where variable speed was necessary. Why not start off direct by "cracking" the switch in and letting the motors get away? With the right sort of switch, motors of 300, 400, or 500 h.p. in a power station could be started in that way. There was no reason why fans should not be driven by variable-speed commutator motors.

The author briefly replied to the points raised by the speakers.

These pictures show a 60,000-V Henley oil-filled cable being laid at Streetgate, near Newcastle-upon-Tyne

Radio Investigation in the Arctic Circle

AT the first Friday evening discourse at the ROYAL INSTITUTION on October 27th, Prof. E. V. Appleton reported some of the results obtained by the British Radio Expedition to the Arctic Circle carried out under the auspices of the Department of Scientific and Industrial Research. The expedition to Tromso (Northern Norway) had two main objects, *viz.*, to discover why wireless waves frequently found it difficult to cross the North Pole, which they had to do in many commercial communications, and to study exactly how the sun produced and controlled the electrification in the upper layers of the atmosphere (the Heaviside and Appleton layers).

Both problems, the professor said, had been solved. He showed records and slides definitely indicating that during magnetic storms, which occurred more frequently than not in Arctic latitudes, electrification at the lowest levels of the Heaviside layer was increased to such an extent that wireless waves were completely absorbed in this region, so that the layers could play no part in reflecting them and thus helping them to travel great distances.

The Sun's Effects

As regarded the constitution of the layers, there had been acute difference of opinion—one party saying that the electrification was due to the ultra-violet light of the sun, the other that it was due to the bombardment of our atmosphere by streams of particles shot out from the sun. The expedition had been able to reconcile both points of view, as the results obtained showed that the main cause of the electrification in both layers was the ultra-violet light of the sun. Under magnetically quiet conditions (no magnetic storms) this electrification was actually less in the Arctic regions than in England, which was to be expected because of the flatter angle at which the sun's rays struck the earth near the poles.

While the normal undisturbed conditions fitted in with the ultra-violet light theory, the conditions during magnetic disturbances and auroral displays could only be satisfactorily explained on the assumption that the electrification spread to abnormally low levels because of the influx of particles from outside the earth's atmosphere, other symptoms of this influx being the magnetic storms and auroral displays themselves.

Supporting experiments presented by Mr. Watson Watt in the library of the Royal Institution after the lecture well illustrated the behaviour of these incoming particles when influenced by the magnetism of the earth. Streams of electrons in a vacuum tube were shown to strike a magnetic model of the earth near the poles and to avoid the tropics, being caught up and deflected by the earth's magnetic field. The very complicated paths followed by the electrons, often looping back on themselves, realistically imitated auroral displays. In another experiment devised by Mr. Watson Watt, the wireless methods used in the Arctic Circle expedition were imitated by a model in which sound waves travelling at 1,100 ft. per second took the place of wireless waves travelling at 1,000 million ft. per second. The electrified layers were represented by a board by which the sound waves were reflected. As the board was moved up and down, its height above the ground was measured by the delay imposed on the waves in returning to the transmitting and receiving station below it. The "splitting" of echo signals, which in the case of electric waves causes fading and distortion in long-distance communications, was also strikingly reproduced.

The actual receiver used by the Arctic Circle expedition was shown in operation, measuring the height of the layers over London, using pulses of energy emitted from King's College, Strand. Prof. Appleton also showed a film prepared by the National Physical Laboratory (Radio Research Station, Slough) further illustrating wireless echo measurements and the variability of the layers.

Electricity and Education

The Board of Education has just issued a 100-page "Handbook of Suggestions on Health Education" (Stationery Office, 6d.). One chapter gives suggestions for studies, which include labour-saving appliances in the home, electricity *v.* gas for heating and lighting, the lighting of the town and of the school, and ventilation.

Battery Making at Walthamstow

The eighth Ever Ready London factory

DEPUTISING for Mr. Magnus Goodfellow, chairman of the company, who was prevented by indisposition from presiding personally on the occasion of a Press visit last week, Mr. Arthur H. Sheppard, sales manager, explained why the new dry battery works at Walthamstow of the Ever Ready Co. (Gt. Britain), Ltd., was the company's eighth in London.

No single site in the metropolitan area was suitable for so large a factory as they required, and they had absorbed most of the available workpeople of the type needed in the other districts where they had factories. Besides the eight works in London the company had others in the provinces, elsewhere in the Empire, and also abroad, a total of twenty-eight in all, with an area of one and a third million square feet, and employing over 12,000 people.

Some of the plant at the new Ever Ready factory: Left, one of the stamping machines. Centre: A machine which cuts, bends and solders the canisters. Right: Girls assembling h.t. batteries

A Variety of Types

The company claimed to be the largest maker of dry batteries in this country, if not in the world. Its prices were in many cases lower, and in no case higher, than before the imposition of the import duty.

All sorts of dry batteries are produced, besides radio and torch-light varieties. For instance, the company has received a large order from the General Post Office for the supply of battery lamps for postmen and for the cycles of telegraph messenger boys. The new Walthamstow factory has a floor area of 175,000 sq. ft. and is capable of considerable extension. Liberal use is made of machinery, one machine, for example, being capable of producing 800,000 bases per day for one type of cell alone, while the company prides itself on making every part of a dry cell, the large manganese grinding and mixing plant at the Walthamstow factory being one of the most up to date of its kind.

Manufacture starts on the top floor and proceeds downward. Manganese powder from the grinding mill on the ground floor is pumped up direct to the mixing room and fed from storage bins to a travelling weighing hopper, which delivers it to the bobbin-making machines. This is a semi-manual operation, the moist powder being scooped by hand into the stamp and compressed round the central carbon-rod electrode.

Versatile Machines

Each of a battery of twelve machines produces the complete cups which form the casing for the dry cell. The cups are made from strip zinc, which is fed into the machines from a roll, folded into cylindrical form, a base inserted, and then passed on to the spokes of a rimless wheel where the base is soldered into position. The complete cup is passed on to a conveyor belt to girls, who examine the cups in batches of over 400 at a time.

The electrolyte is manufactured in rubber-lined tanks, and pipes transfer the solution from tank to tank under compressed air.

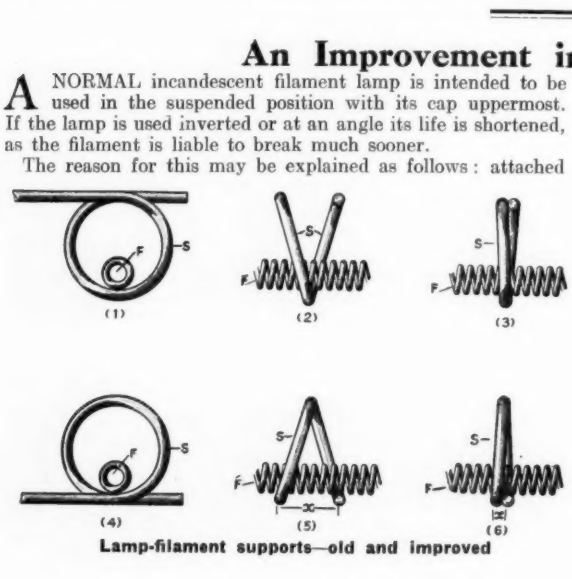
The finished cups are fed automatically under nozzles and machines which insert the requisite amount of electrolyte and also the insulating washer at the bottom of the cup. Bobbins are then fitted in the cups by hand and conveyors take the cells through a hot water bath to set the electrolyte. The final stage in this machine is the fitting of a brass cap to the electrode and the sealing of the cell. Finished torch cells are tested by a photo-electric device which automatically rejects defective cells before they are fitted with their outer covering, packed and labelled.

Transport is by conveyor belts. In the punch press department zinc bases, brass caps, cardboard insulating washers, &c., are produced from rolls of materials. There is a machine room for making tools and machine parts, a first-aid section, a large canteen, wash-rooms and shower bath accommodation. Every employé has his or her personal locker, while those whose work is dirty have two lockers apiece, one for their clean clothes and the other for their factory overalls.

An Improvement in Lamp Construction

A NORMAL incandescent filament lamp is intended to be used in the suspended position with its cap uppermost. If the lamp is used inverted or at an angle its life is shortened, as the filament is liable to break much sooner.

The reason for this may be explained as follows: attached to the glass stem inside the lamp bulb are several short wires which support the filament. These supports S are coiled once round the filament F, so that in the normal suspended position contact is made at one point only as shown in figs. 1 and 2. Now, when the lamp is inverted or set at an angle, the filament moves round and rests on the double portion of the open coil hook support as indicated in figs. 4 and 5. The number of points of contact between filament and supports is thus doubled. The result is that the portion of the filament marked x (fig. 5) is virtually short-circuited, which causes a difference of temperature and so shortens the life of that portion of the filament.



Lamp-filament supports—old and improved

In order to rectify this defect, Philips Lamps, Ltd., have improved their lamps as shown in figs. 3 and 6, from which it will be noticed that the supporting hook S is coiled tightly instead of openly. The distance x (fig. 6) is much reduced, as compared with fig. 5, so that there is a single point of contact only, both when suspended, fig. 3, and inverted, fig. 6.

Though this modification of assembly may appear to be small, its realisation has involved considerable development of automatic lamp-making machinery and has resulted in the production of an improved lamp which can be used in any position irrespective of filament support.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Radio Relay Concessions

The recent article by "Relay Engineer" on "Radio Relay Systems" advocated methods which, I feel, should not remain unchallenged. We were told, for instance, that the directors should be men of "local influence" able to "pull invisible wires"; that the agreement arrived at after "haggling" and "asking for plenty in order to make much show of sacrifice" should "cover the minimum possible payment in return." Defiance of the regulations embodies in the licence issued by the P.M.G. (which, presumably, are the law of the land framed for the general good) is stated to be inadvisable, not because it would be wrong and illegal, but because "the risk of cancellation does not make infringement worth while."

It cannot be asserted that the radio relay business is one which need take no cognisance of ordinary standards of business morality; the methods advocated, however, definitely do not come within this category. That such methods are used in business every day is deplorable; that they should be publicly advocated is amazing.

If such methods were universally adopted in all businesses (and what is right for one business is right for another) no transaction would ever be concluded cleanly, a fair price would never be given or obtained for goods or services, the technical merit of an article would be of little importance, and confidence between buyer and seller would be non-existent. Such confidence, after all, is the fundamental basis of general prosperity in business.

That the radio relay business is a "public service" is no excuse; selling canned music is no more important than selling canned peas. ANOTHER ENGINEER.

October 28th.

The N.J.I.C. for the Supply Industry

My attention has been drawn to the report, in the current issue of the ELECTRICAL REVIEW, of the presentation to Alderman Walker, chairman of the National Joint Council for the Electricity Supply Industry and Lord Mayor of Manchester, at a luncheon in the Town Hall, Manchester, on October 20th. In this I am reported to have made the following statement:—

> He suggested that the employers should provide paid assistance to Mr. A. H. Banks (secretary to the N.J.B. and labour adviser to the employers' side of the N.J.B. and N.J.C.).

What I actually said was entirely to the contrary, and was to the effect that on my own retirement, which could not be long delayed, the workmen's side would be well-advised to appoint a full-time paid secretary, in view of the advantage which had obviously accrued to the employers' side through the secretaryship of Mr. Banks.

The words attributed to me are much more than merely annoying to Mr. Banks, and I must ask you to contradict fully the mis-statement in your next issue. GEO. P. DEANE,

Secretary, Workmen's Side, N.J.I.C., for the E.S. Industry.

East Ham, E.6, *October 29th.*

Warming Buildings by Electricity

My appeal to the E.D.A. for caution when offering advice to electricity salesmen was not addressed to the whole industry but to the E.D.A. and Mr. Lesser as the originator of the propaganda. I venture to suggest that Mr. Lesser is being very bold when he suggests that the E.D.A. is the "voice pipe" of the whole industry. I consider my appeal for caution to be fully justified. A. COPELAND.

Winchester, *October 27th.*

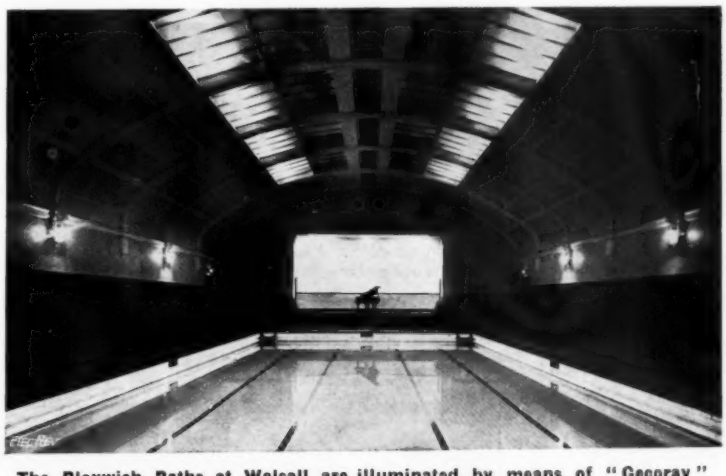
A Commercial Electrical Association

We all desire to see our industry progress in its many spheres, but if we are thoroughly honest with ourselves must we not admit that more than half of the present associations in the electrical trade have in no way helped to make electricity popular?

I think we should tell ourselves the truth, starting at the consumer's end. We still have costly current, bad electrical work, and an ever-increasing army of second-rate salesmen calling on our wives, supported by doubtful sales tactics. Someone has stated that sales managers should be able to instruct their representatives better how to sell. Surely, if their business was properly organised, and they were capable of choosing, and paying for, the right men, they would be saved a lot of time, without the need for an association.

Then there is a more important view. Most trade sales managers and representatives find it better to keep away from associations which encourage conversation on their business arrangements and selling methods. Surely, it is obvious that bodies like the B.E.A.M.A., the C.M.A., the E.L.M.A., and many others, will not altogether have faith in men who discuss their sales, or even pretend to improve them, in a commercial association. Let us get on with work that counts!

Romford, *October 27th.* F. H. PAGE.



The Bloxwich Baths at Walsall are illuminated by means of "Gecoray" floodlight units, equipped with 200-W lamps, which direct the light on to the pool with the results illustrated

Referring to Mr. M. W. Singer's letter in your current issue I think that the present time is most opportune for the formation of a British Commercial Electrical Association, particularly so, having in mind the reconstitution of the E.D.A. As Mr. Singer states, it is the commercial men themselves who should decide whether an association is desirable or not. I would suggest that all interested in the formation of such a body should send in their names and addresses to the Editor. Later area meetings might be convened and progress reported from time to time.

So far the great majority against the formation of such an association are other than commercial men—why?

South Shields, *October 30th.* J. C. PETERSEN, A.C.I.S.

The Gebus System

With reference to the very interesting paper published in the ELECTRICAL REVIEW of October 6th (page 454), may I point out that I established graphically the working conditions of the so-called "Gebus System" in a paper published as early as 1908 in *La Lumière Electrique* (May 30th, page 263)?

Paris, *October 27th.* J. BETHENOD.

Current Transformers

I have read with interest the correspondence which has recently appeared in your columns between Messrs. C. W. Stubbings and Thomas Ellis regarding the effect of a single phase-to-earth fault on the secondary side of an unearthed star/earthed star power transformer. In his original article Mr. Stubbings pointed out that with the above fault conditions a zero sequence component could flow in the secondary side but not in the primary—a statement with which Mr. Ellis disagrees on the grounds that a zero sequence component would be required to exist in the primary windings to compensate for the ampere-turns due to the zero sequence component in the secondary.

It would appear to me that the whole question depends on the type of power transformer being considered. If the latter is of the three-phase shell type or consists of three single-phase units forming a three-phase bank then, as pointed out by Mr. Ellis, no zero sequence component can appear in the secondary for an earth fault on this side. On the other hand, with a three-phase core-type transformer, owing to the interlinking of the magnetic circuits there is no iron return path for the flux set up by the sequence currents in the three phases and, in consequence, relatively little flux is produced within the transformer by these currents. The effect of the interlinked magnetic circuit is best understood if it be imagined

that a closed winding of very high impedance is present, the case then being analogous to that of a transformer connected unearthed star/earthed star with delta tertiary.

Provided, therefore, that the transformer is of the three-phase core type, the statement of Mr. Stubbings that a zero sequence current can exist in the secondary winding without there being a corresponding component in the primary is correct. The compensating ampere-turns to balance the *total* secondary current will be provided by the positive and negative sequence components in the primary. G. A. Robertson.

Fallowfield, Manchester, *October 27th.*

The Heating of Lampholders

Mr. Howard Long, in his letter published in your issue of October 20th, points out that many readers must have long experience of "Benjamin" porcelain lampholders, and will know that broken skirts are a very infrequent occurrence. I quite agree that porcelain skirted lampholders in "Benjamin" and similar types of fittings do not frequently get broken, due in my opinion to the fact that the steel reflectors in which they are housed provide them with an excellent protection from accidental breakage, but if they were installed in the same manner as the bulk of bakelite lampholders I am still of the opinion that broken skirts would not be an "infrequent occurrence."

With regard to Mr. Long's remarks regarding the importance of avoiding the heating of cables, if he will refer to my previous letter he will note that I stressed the importance of properly ventilating skirts, and I can only repeat that if this is done one does not get any undue heating of either the lampholder or the cables.

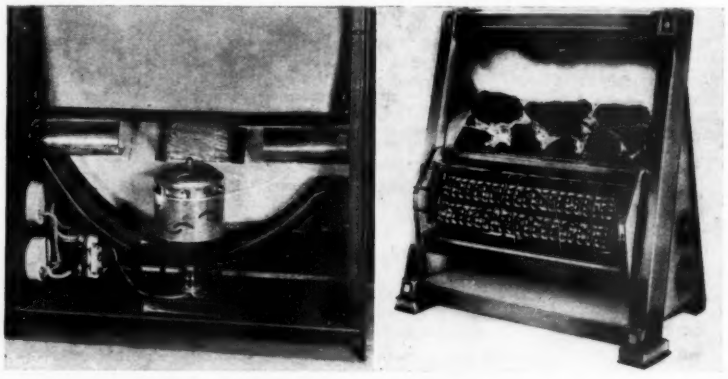
In the concluding portion of his letter Mr. Long refers to the new "Saaflux" system of lighting equipment which has been developed by his company as a method of reducing the temperature of the cables to within "I.E.E." limits. Whilst I agree that in this system the question of keeping the cables cool seems to be amply catered for, I do not see how a lighting system can be used as an argument in connection with the subject that originally formed the basis of this correspondence.

Lymm, Warrington, *October 30th.* John Bolt.

New "Premier" Fires

Most persons are familiar with the ordinary types of electric coal fire in which an attempt is made to simulate the movements of a real fire by means of a rotating fan or similar contrivance.

In the new "Grenville" fire (price £4 10s.) made by Premier Electric Heaters, Ltd., Ruby Street, Birmingham, realistically shaped flames leap and jump in an upward direction at irregular intervals over the whole length of a wide screen, this appearance being attained in a very ingenious, yet simple, manner.



The "Grenville" fire showing flicker device

A cylinder, in the walls of which are pierced specially shaped slots at certain intervals, is made to revolve round a lamp, the slots being so placed in relation to the filament of the lamp as to transmit moving beams of light in a horizontal direction on to two chromium-plated mirrors, placed one on each side of the cylinder, at about 45 deg. The effect of these mirrors is to render the light beams parallel, but obviously if both mirrors were of similar section, and the light beams from them were projected on to a screen, those produced by the slots in opposite sides of the cylinder would move in opposite directions: thus if the beams appearing on the left hand side of the screen moved upwards, those on the right hand side would move downwards.

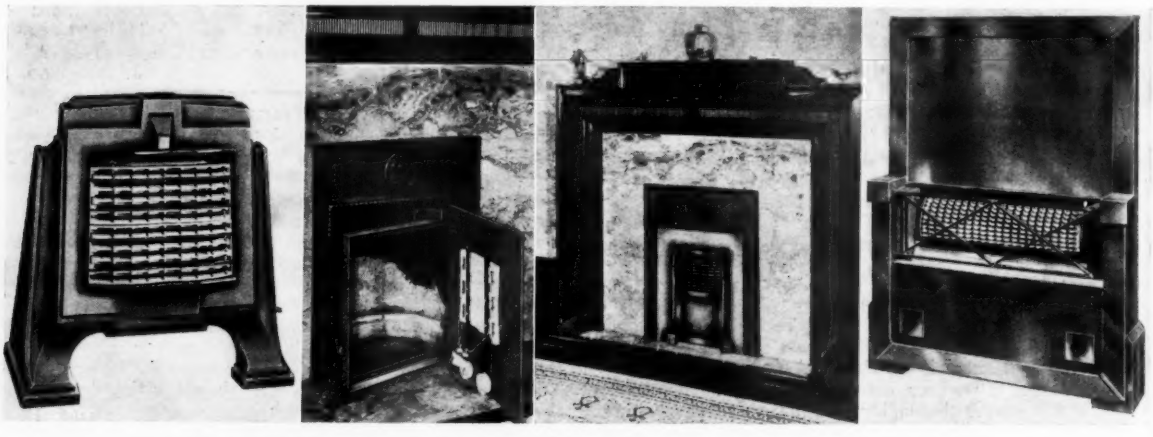
This difficulty is overcome by making one of the mirrors concave in section, so that before the beams reflected by it reach the screen, they are reversed in direction, thus producing upwardly moving beams over the entire length of the screen.

Although the cylinder revolves at an even speed, the slots are so shaped as to produce on the screen flames which appear to jump in places, and they are also so spaced that the flames rising on each side never present the same appearance together. It is difficult to believe that the thoroughly irregular effect is produced from an evenly moving source.

Another recent development of the company is a special frame for enabling the £5 10s. "Alton" inset and larger £10 10s. "Ellesmere" panel fires to be fitted into the openings of existing fireplaces. The frame is secured by means of sets of screws at the top and bottom on both sides, which engage with the inside surfaces of the fireplace opening. When the screws are tightened up the frame provides an inexpensive rigid mounting without damaging the fireplace. Two metal straps, one upright and the other sloping towards the back of the chimney, hold the frame in position while it is being fitted.

Special three-joint flap hinges allow the fire to be set dead central in case of any irregularity in the fireplace opening, and also enable it to be swung out at right angles for inspection of connections at the back.

The "Royal" fire is a new model for all-round utility, priced at £1 14s. The cast body is spray finished in antique copper or oxidised silver; there is a single switch, and two double radius firebars.



The "Royal," "Alton" (before installation and in position) and "Ellesmere" fires

The "City" model is available with single or double elements at from 17s. 6d. to £1 10s., sprayed antique copper or oxidised silver, or with a vitreous enamel finish in three colours.

New Apparatus and Devices

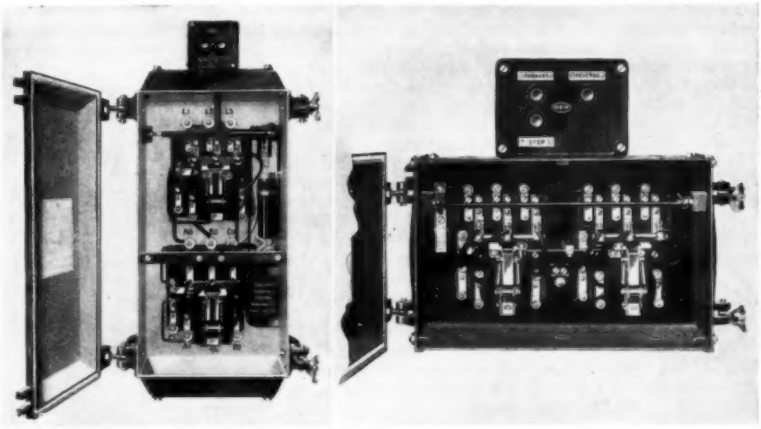
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Motor Starting Gear

The MIDLAND ELECTRIC MANFG. CO., LTD., Barford Street, Birmingham, has extended the range of the "Auto-Memota" starting switches, by the introduction of a larger size direct-on-line push-button starter, suitable for motors up to 15 h.p., 200 to 500 V, and also by the introduction of a new automatic star-delta starter, push-button controlled, and a range of motor reversing controllers.

The star-delta starter comprises a main-line contactor, and a special change-over contactor, which changes the connection of motor windings from star to delta. The change-over contactor operates when the coil circuit is closed by a thermally operated relay, about 20 seconds after the closing of the main-line contactor. The motor thus has ample time to gain speed before the change-over takes place. The thermal relay is automatically cut out of circuit in the delta or running position, and the length of time delay can be adjusted within reasonable limits. Thermal over-load trips, which are adjustable over a wide range, are provided on all three phases and no-volt protection is inherent. The starter is enclosed in an iron case with the push-button in a separate box, which may be used for local or remote control. The starter is entirely automatic, after the start button has been pressed, and is available for motors of 2 to 15 h.p. working on 200 to 250 V.

The reversing controller consists of two contactors mechanically interlocked and arranged with push-button box for start, stop and reverse. Thermal-overload trips are fitted on all phases, to give protection to the motor running in either direction. Two sizes are available, covering the requirements for motors of ½ to 15 h.p., 200 to 500 V. Isolating links are available for the whole range of M.E.M. control gear.



The "Auto-Memota" star-delta starter and a motor reversing controller

Infra-red Elements

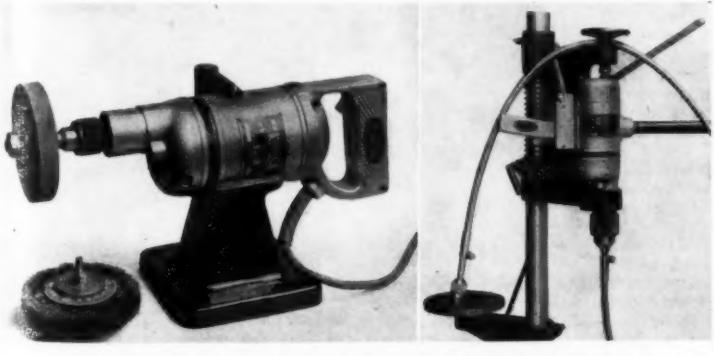
THE MODINSTAL ELECTRIC CO., 1, King Street, W.3, announces that a branch of business is being developed in the form of the manufacture of elements for infra-red projectors. They are divided into classes "S" and "R2," both being designed to run at black heat. Model "S" has a former of the bowl-fire element type and is fitted with a 1in. E.S. cap. This has a plated domed end plate and is wound with good-quality nichrome wire, guaranteed to run at black heat with wattages up to 165 W. Type "R2" has a built-up cross-section former of special heat-resisting material, and is fitted with a similar cap and wire, also guaranteed to run at a black heat (460 W). Both models are finished in special heat-resisting paint and have overall dimensions as follows: Type "S," 5 in. by 2¼ in.; type "R2," 7 in. by 2¼ in., and the prices are 5s. 6d. and 12s. 6d. respectively. A hand local reflector fitted with an "R2" element (as illustrated) costs £3.

The Modinstal hand local reflector with 460-W infra-red element

Portable Electric Tools

Three new "Val-d'or" portable tools are being marketed in this country by Messrs. E. L. YOUNGLESON, LTD., 67, Chancery Lane, W.C.2. Type "P" is a portable garage model which runs at 2,500 r.p.m. A universal motor, rated at 220 W, is incorporated, and the tool will take a ¼-in. drill, while the price and weight are £7 10s. and 6 lb. 3 oz. respectively.

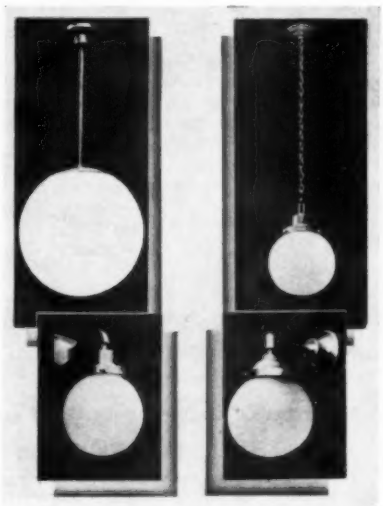
Type "G," with a ¾-in. chuck, is designed for use with a flexible drive, and is fitted with a 350-W universal motor. Models can be supplied for speeds of 2,500 or 1,500 r.p.m. at £16 12s., and the weight is 18 lb. 10 oz. A special model for cylinder grinders with a ⅝-in. chuck (450 r.p.m.) costs £18 13s., weighs 39 lb. 11 oz., and is fitted with a 600-W motor.



Types "P" and "G" "Val d'Or" portable tools

"Sunspheres"

Five new types of fittings, known as "Sunspheres," have been introduced by the SUN ELECTRICAL CO., LTD., 118, Charing Cross Road, W.C.2. Type L.8150/2 is available with a diameter of 10, 12 or 14 in., priced at £1 2s. 6d., £1 5s., and £1 10s. respectively. Type L.8160/1, which is a ceiling fitting with a spherical globe on a gallery costs 8s. 6d. (6 in. diameter model), and the 7-in. model 10s. 6d. A similar sphere fitted to a light cast bracket (L.8164/5) is priced at 17s. 3d. (6 in.) and 19s. (7 in.). Another bracket model (L.8168/9) with a 6-in. projection costs 12s. 9d. (6-in. diameter sphere) and 14s. 3d. (7 in.). These prices are for white enamelled or for imitation bronze finish; chromium plate costs a few shillings extra. Six-inch diameter globes will take 60-W lamps, while the 7-in. models will take 100-W lamps. A "Sunsphere" chain pendant costs 11s. and 13s. respectively.



Sunspheres": (Above) L8150/2 and L8156; (below) L8164/5 and L8168/9

Bakelised-fabric Bearing Bushes

By reducing "Novotext" bakelised fabric to small flakes ("Novotext Flake") of approximately 1 sq. cm., and by moulding these in suitable tools under pressure and heat, it is possible to produce moulded articles which are not too intricate in shape or too small in wall thickness. The flake material retains practically the same very high tensile strength as that of the laminated material, so that it may be used where high mechanical properties are required, while it is also resistant to oil, weak acids and alkalis, to humidity, and to temperatures up to 100 deg. C. Test results show that bearing bushes of the new material are very economical.

D

Bushes made from "Novotext" were fitted into the rolling frames of a wire mill, the design of the liners being unchanged. Instead of being cooled on one side only, as had been the practice with the lignum vitæ bushes, the water was introduced at both sides, and to make sure that the water could get in, the diameter of the bush was made about 0.020 in. larger than that of the roll shaft. The shaft in the bearing bush had a diameter of 5.712 in. and revolved at 223 r.p.m., and after it had worked itself into the bush, the highest specific bearing pressure was measured at about 1,000 lb. per sq. in. Eighteen months' satisfactory service was given. Based on the assumption that only ten fabric bearing bushes would be produced from the one tool (which could serve for several thousand bushes), and apportioning the part cost of the tool to the cost of the bush, it is calculated that the total cost per bearing bush for the eighteen months' service is less than half that of the six ordinary bushes which would have been required for the bearing in the same time.

It is claimed further that by the use of the bakelised bushes the rolling mill product is improved in that adjustments necessary to maintain the exact distance between the rolls are practically eliminated, so that the rolled material leaves the mill in a more even condition. "Novotext" products are supplied by the A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1.

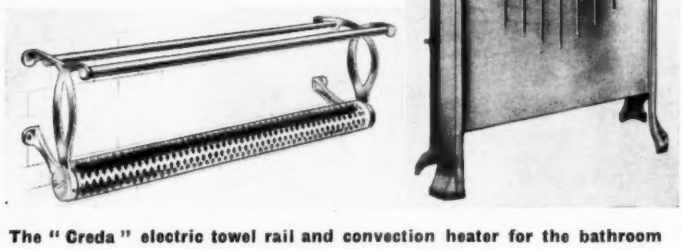
An anti-vibration fitting

A Lamp Shock Absorber

In factories, tunnels, railway stations and other places where there is a great deal of vibration lamps often fail through the breakage of the filament. In order to minimise such failures MESSRS. EDWARD SMITH (ELECTRICAL ACCESSORIES), LTD., 16, Ashwin Street, E.8, have introduced a patent shock absorber. Our illustration shows how the apparatus is used in practice. The reels round which the flex is looped are made of insulating material, and the curved metal strip is of spring steel. The price is 11s. 9d. per dozen.

"Creda" Bathroom Appliances

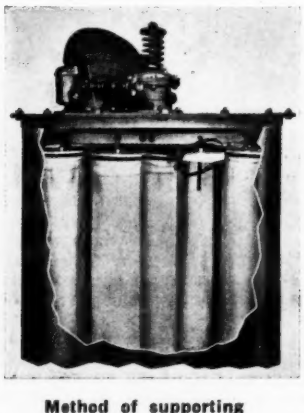
The SIMPLEX ELECTRIC CO., LTD., 159, Great Charles Street, Birmingham, 3, has introduced a second towel rail a little more expensive than the No. 1 model, *i.e.*, 45s. It is also loaded at 125 W, but has two "spreader rails" above the heater. The dimnesions are 28½ in. long by 8 in. high by 8 in. deep. A 125-W towel airer and stand has also made its appearance; this costs £4 4s. A new bathroom convection heater, measuring 29 in. high by 22½ in. wide by 7 in. deep costs £3 3s. in white cellulose and £2 10s. more in white porcelain enamel.



The "Creda" electric towel rail and convection heater for the bathroom

Dust Extraction

The POWER GAS CORPORATION, LTD., Parkfield Works, Stockton-on-Tees, has undertaken the manufacture in Great Britain of the "Dracco" dust-extraction system. This apparatus is built up in units of from ten to twelve compartments, each consisting of a m.s. casing, dust hopper top plate, cleaning mechanism, and filter bags.



Method of supporting filter bags

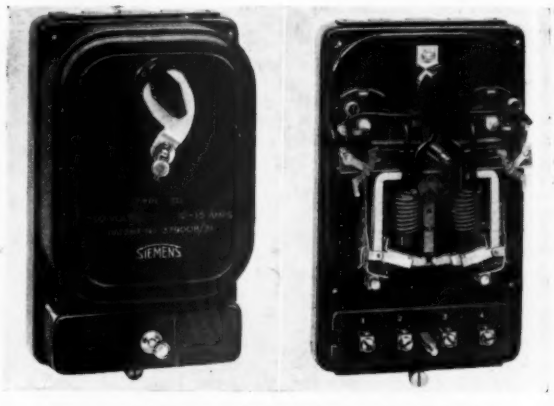
Each unit is fitted with gas or air inlet and outlet manifolds, and a timing mechanism incorporated with the top plate of one unit. The outlet is coupled to an exhaust fan, the entrained solids being deposited in uniform layers on the inside of the bags, which are automatically cleaned at regular intervals by being shaken while temporarily taken out of service (one compartment at a time) for from two to four seconds. The disconnecting damper is closed indirectly by the timing mechanism.

During the bag-shaking process, air is admitted from the atmosphere in a direction opposed to the normal. The average age of the filter bags is from one to five years, depending upon the condition of the gas to be treated.

The power equivalent of the compressed-air supply for operating the shaking mechanism is about ¼ to ½ h.p. per 1,000 cu. ft. of gas per min. For the exhaust fan (to overcome filter resistance only) 1½ h.p. per 1,000 cu. ft. per min. is required. The filtering efficiency is said to be approximately 99 per cent.

An Automatic House Service Switch

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38, Upper Thames Street, E.C.4, have introduced an automatic miniature air-break circuit-breaker for the overload protection of house installations and small power circuits. It is also suitable for



The new Siemens automatic house service switch

use as a current limiter, for which purpose the overload trips can be adjusted to operate at a predetermined current.

The switch is double-pole and suitable for use on 250 V d.c. or a.c. supply. It trips instantaneously on short-circuit, but a thermal time lag device ensures that a momentary overload, such as that caused by the starting of a motor, will not trip the switch. This device has a true inverse time characteristic, and in the 2.5 to 5 A switch the settings are approximately in ½ A steps and in the 10, 15 and 20 A sizes each step is approximately 1 A.

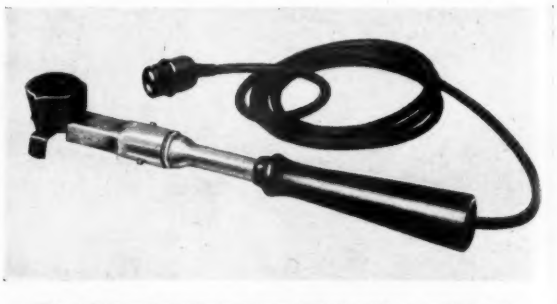
The base and cover are of mild steel, stove enamelled, the terminals being protected by a cover of moulded insulating material. The switch can be used as an "on" and "off" switch and is provided with a free movement handle of insulating material. Each pole is broken in two places, thereby reducing arcing at the contacts. The contact brushes are equipped with final breaking blades to protect the main contact blades.

An earthing connection is provided on the base, and a device can be supplied for locking and sealing the switch in the "off" position; the terminal cover may also be sealed in position. The incoming and outgoing wires may be brought either down the back of the switch or directly to the terminal block, knockouts being provided in the top and bottom of the base for this purpose. The list price is 26s. 6d.

"Solon" Solder Pots

MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., have sent us a sample of a new solder pot which can be fitted, by means of a metal strap and two fixing screws, to the domestic type "Solon" electric soldering iron. It is of cast-iron with a pouring lip, and it measures 1⅜ in. by 1 in. by ¾ in.

With this pot it is possible to use up all the scraps of solder



The "Solon" soldering iron fitted with a solder pot

usually wasted, and it is convenient to use. The solder is kept in a molten state all the time the current is on. The pot is obtainable independently of the soldering iron at 1s., or complete with the iron at 8s. 6d.

Electrical Shopkeepers. By Joseph Orringe, A.M.I.E.E.

Their position as "points of public contact"

IN the ELECTRICAL REVIEW of October 20th Mr. F. D. Parker contributed a brief article on "The Grid and the Small Contractor" in which he raised many points of very great interest. Broadly, Mr. Parker pointed out—not for the first time, of course—that the operation of the grid might relieve some of the individuals and forces heretofore engaged in electricity supply (generation and distribution) thereby giving them increased freedom and time to devote to development and sales. Mr. Parker suggested that this might be detrimental to the interests of electrical contractor-shopkeepers, and he put forward several suggestions whereby local contractors might be *used* by supply authorities in the great cause of domestic electrification.

It is under this latter heading that I would ask our responsible electrical leaders to give special thought to the best and most sensible lines of electrical development. Take, for example, the problem of the large and lavishly fitted electricity supply showroom. Few will dispute the need for such an imposing and centralised electrical display. In many areas an impressive gas showroom calls for an equally imposing electrical demonstration centre.

Mr. J. Orringe is president of the Electrical Contractors' Association

In any case, in order to develop electric cooking and the heavier domestic services it is essential to have such a demonstration centre with adequate space and equipment to deal with local audiences capable of being drawn together and interested in these topics (with very useful effect upon the electrical industry as a whole); but I submit very seriously indeed that such centralised showrooms ought *not* to be operated in any way that is detrimental to the smaller and privately-owned electrical shops already existing, or that may be established, in the area of the supply authority concerned.

In this matter I would direct attention to the fact that the gas industry is making a determined effort to secure the interest and support of ironmongers whereby gas equipment may be given a wider public display. By intensive competition the gas industry many years ago practically wiped out the "gas contractor"; but, now that electrical competition in the domestic field is becoming so intense, the gas industry realises its extreme weakness in points of public contact and is attempting to correct and repair its early folly by enlisting the support of the ironmongers.

The Place of the Smaller Showroom

In his article on October 20th Mr. Parker raises another interesting point in this very direction. He suggests that many of the centralised electricity supply showrooms recently built and equipped are so "immaculate and elaborate" that the self-conscious or poorer type of would-be buyer "proceeds no further than the threshold." This is a very sound observation worthy of due notice by electricity suppliers. A very large section of the general community hesitates or is reluctant to enter a somewhat imposing emporium—a showroom in which members of this section of the public feel rather out of place—and this fact alone suggests the need for supply authorities to encourage and support all the minor or less frightening electrical shops that exist or may be established in their areas.

Ways and means to achieve this constructive end are only too apparent. The one thing needed is sensible and broad-minded co-operative organisation. Take, for example, the current "Wizard in the Wall" advertising campaign initiated by the Electrical Development Association on behalf of its supply authority subscribers. It is surely clear that these newspaper advertisements ought to have been reflected and emphasised in every electrical shop window in the country. If the entire electrical shop window-owning community had been advised that the "Wizard in the Wall" advertisements were commencing on such-and-such a date, and if the electrical shopkeepers had been provided with suitable posters or display bills inviting the public to "step inside" in order to see the "Wizard in the Wall"—in order to secure details of modern and inexpensive wiring systems—the useful effect of the newspaper advertising would have been enormously strengthened. Nothing of the sort, however, appears to have been done. The newspaper advertising was launched without the necessary points of public contact having been prepared and arranged beforehand.

How it Should Have Been Done

It is quite impossible to imagine that an ordinary national advertiser with commercial ends in view would behave in this way. A company promoting the national advertising of a brand of pills or hair lotion would take uncommonly good care to organise *all* its retailers beforehand. It would see that stocks were distributed all over the country and it would provide shop-window bills and eye-catching displays free of all charge to those who were willing to play a part in this extensive national drive. The pill or lotion merchant would realise that he was spending ten thousand pounds on newspaper advertising and that a few hundreds more spent in catching the public eye in local shops was neither here nor there. Indeed, he would regard these arrangements as providing the essential feature of his campaign.

In the same way it is surely no more than common sense for supply authorities to establish definite relations with local electrical shopkeepers in order to secure the widest possible display of cookers, water-heaters, and so forth that the supply authority is prepared to issue on hire or hire-purchase? Here, again, it is simply a question of co-operative organisation. In any case the printed matter issued by supply authorities relative to rates of supply, hiring terms, and so forth should be freely available in *all* electrical shops in the locality. Why attempt to concentrate electrical information in one centralised showroom when a dozen other points of public contact in a town or area would be available if the proper organisation was once set on foot?

In the Courts

IN the House of Lords last week the St. James' & Pall Mall Electric Light Co., Ltd., appealed from the judgment of the Court of Appeal allowing the appeal of the City of Westminster Assessment Committee from the judgment of a King's Bench Divisional Court.

The appellant company claimed that the gross and net rateable values of its buildings, machinery, mains and appurtenances for the supply of electricity should be reduced from £110,000 and £55,000 respectively to £72,664 and £36,332, account being taken of sinking funds which the company had to provide under the Act providing for the transfer of the company's undertaking to the London and Home Counties Joint Electricity Authority in 1971. The Divisional Court upheld this contention, holding that in arriving at the rateable value of the undertaking on the profits basis the sinking fund payments must be deducted from the profits since a hypothetical tenant would not pay a higher rent to collect revenue from which he could derive no benefit. The Court of Appeal, however, reversed that decision, holding that the sums which the company was required to set aside for the sinking funds should not be excluded from the receipts or allowed as a deduction therefrom. From this result the company now appealed.

Mr. Wilfrid Greene, K.C., for the appellants, said that the question for decision arose under the London Electricity (No. 2) Act, 1925. This Act, in his submission, made an entirely novel provision for enabling the electricity undertakings to be purchased by a public body. The method was that consumers should provide the purchase price by paying a little more for their electricity for a period of forty years when the company's tenure came to an end.

Lord Tomlin suggested that the long and the short of the matter was that the undertakers had to part with their property in 1971 to a body which did not in reality pay a penny for it, but in the meantime the undertakers had the right to extract from their consumers something which would compensate them for not having any purchase money.

Mr. Greene replied that in substance that was so. When the undertaking became the property of the Joint Electricity Authority the profit-making element would disappear—it was really up-to-date Socialism. The company's case was that the sums set aside for the sinking funds should be excluded from the company's receipts in arriving at the rateable value of the undertaking.

At the conclusion of Mr. Greene's address for the appellants, their Lordships intimated that they did not desire to hear Mr. Tyldesley Jones, K.C., for the respondents, and reserved judgment.

A Grid Tariff for South-East England

A GRID tariff is to come into force in the South-East England and East England Areas on January 1st next. For trading purposes the Central Electricity Board proposes to regard the two areas as one. They cover a district 12,226 sq. miles in area lying between the Wash and the South Coast, the western boundary marked approximately by Peterborough, Bedford, Reading and Littlehampton. The population is about 13¼ million (29 per cent. of the U.K. total). Authorised undertakings in the areas generated 4,000 million kWh last year, or a third of the United Kingdom output.

The thirty-seven selected stations in the combined area include the new Battersea station and the Fulham station now under construction; and two other new stations (as yet undecided upon) referred to in the original scheme. Other principal stations include Barking (which is the largest in the country and last year achieved a thermal efficiency of 23.55 per cent), Brimsdown (21.08 per cent.), West Ham, Croydon, Stepney, Hackney, Bankside, and Norwich. The power stations and eighty-eight transforming and switching stations are interconnected by 690 miles of 132-kV lines (including fifteen miles of cable) and 399 miles of lower voltage lines (including 102 miles of cable). Extensions to the north and west connect with the Mid-East England, Central England, and S.W. England and South Wales Areas.

The new tariff comprises: (a) A service charge for more than one point of supply, the amount depending upon local conditions; (b) a fixed charge of £3 10s. per kW demanded in the four winter months, this charge being reduced by 5s. for each "standard increment of demand" to £2 15s. per kW, and increased by 4s. 6d. for each 0.1 (and *pro rata*) by which the power factor is below 0.85; (c) a running charge of 0.21d. per kWh with coal of 11,500 B.th.u. per lb. at 16s. per ton, varied by 0.0008d. for each penny by which the cost is above or below 16s.

Local rates in respect of selected stations are based on 4s. 3d. per kW of m.c.r. of generating plant in operation during the year. The fixed charge will be varied by 1s. 10d. per kW for each shilling (and *pro rata*) by which the figure is above or below 4s. 3d.

The general conditions of the tariff are identical with those of the tariffs that have been in force in Mid-East England and Central Scotland since the beginning of this year. Parts (a) and (b) are also the same, but the running charge and coal clause in (c) are different with a view to taking into account the diversity of prevailing conditions, thus putting the areas on to a comparable basis. The same consideration applies to rates, the basic figure of which is different from those in the earlier tariffs.

Where electricity is supplied to supplement the output of stations not operated under the control of the Board or to supplement a bulk supply from another undertaking, the m.d. is taken as a minimum of two-thirds of the number of kW for which notice has been given.

The expression "standard increment of demand" means an increase of m.d. over the basic demand of the undertaking in 1932, or 2,000 kW, whichever is the greater. Starting with a basic demand not exceeding 3,000 kW, the increment is 3,000 kW. For every 1,000 kW by which the basic demand exceeds 3,000 kW, the increment is reduced by 100 kW until a basic demand of 22,000 kW is reached; for basic demands in excess of that figure the increment is 1,000 kW.

Special prices may be quoted to enable undertakings to negotiate contracts with consumers for exceptional supplies. For supplies given to other than authorised undertakings, prices will be such as may be agreed.

An article on the Mid-East England tariff—the first issued by the Board—by H. M. Sayers, appeared in the ELECTRICAL REVIEW of November 25th, 1932. The same general considerations apply to the South-East England tariff, which has also been devised to encourage load building.

New Books

Richtig Installieren! By M. MENGERINGHAUSEN and G. EHLERS. 8 pp. text; 54 plates with 300 annotated illustrations. Berlin: V. D. I. Verlag, G.m.b.H. Price: 7.50 Rm.

This is a publication of exceptional interest and value. Its aim is to promote the rational planning and erection of house installations as a whole, with a view to obtaining a satisfactory state of affairs when all the services have been provided. The treatise is prepared "from practice for practise," and if architects and the various trades concerned in the installation of water, gas, electricity, heating, ventilating and sanitary facilities would act on the principles here laid down, the occupiers of buildings would benefit greatly in convenience and safety. Also, in most instances, there would be a saving of expense. The subject of correct, which implies correlated, installation is one the importance of which increases with every addition to interior services of all kinds.

The scope of this collection of annotated plates includes the arrangement of service connections and meters; the space requirements of pipe lines, cooking appliances, water heaters, baths, and so on; methods of fixing, supporting and protecting supply lines; protection against noise and vibration; the arrangement of flues and ducts; and the special requirements of electrical installations. In brief, there is something relating to every branch of installation work, and particular stress is laid on the fact that each service should be considered as part of an organic whole.

The practice recommended is naturally based on German standards, but there is much that is of general applicability. The drawings and photographs of grouped services and complete installations of various interiors are specially instructive. Alternative arrangements are illustrated in many instances. Only four plates are devoted to the special problems of electrical installations; the treatment is restricted rather to the mechanical aspects (arrangement, fixing, etc.) and the drawings in this section are too small for convenience. Taken as a whole, the production is exceptionally good, but the disadvantages of the loose leaves outweigh their occasional convenience.

The Running and Maintenance of Marine Machinery. Pp. xxxiii+97, (illus.). London: Institute of Marine Engineers. Price: 5s. net.

The number of books upon this subject is, unfortunately, far too small, the reason being, no doubt, that such knowledge can be acquired only by practical experience.

Here is a book in which a number of engineers, all of whom have had many years of practical experience, and are recognised authorities in their particular subjects, have summarised the lessons of that experience. The book contains six papers read before the Junior Section of the Institute of Marine Engineers, the subjects being so chosen that the whole constitutes a complete course of instruction for sea-going engineers and apprentices. The papers deal with the running and maintenance under marine conditions of reciprocating steam engines, steam turbines, boilers, Diesel engines, d.c. electrical machinery and refrigerating plant.

The electrical engineer will be especially interested in the fifth of these papers, which has been contributed by Mr. D. M. Cathcart. As indicating the growth in the use of electricity on board ship, the author mentions that whereas in 1920 a fleet of seventy-five cargo ships had generating plant totalling 2,285 kW, or about 30 kW per ship, in 1930 a fleet of eighty-eight cargo ships had 12,832 kW of generating plant, or about 145 kW each, while on many up-to-date passenger liners the electrical load, lighting, heating, cooking and power, exceeds 1,000 kW. Unfortunately the scope of the papers did not include electric propulsions, for which, in large ships, a.c. is employed. The practical engineer will be rewarded by a study of the other papers, particularly those on turbines and Diesel engines, despite the differences which necessarily exist between marine and land types. There is a commendable simplicity of expression in all the papers and the diagrams do much to add to the value of the work.

The Elements of Wireless. By RALPH STRANGER. Pp. 212; figs. 167. London: George Newnes, Ltd. Price: 3s. 6d.

Much of the popularity of this author's books and serials is due to his ability to write upon scientific subjects in perfectly simple language, acquired, no doubt, from his considerable experience as a technical lecturer. He is always careful to elucidate technicalities; in fact, this book is an enlargement upon a first serial with the same title in an endeavour to answer voluminous correspondence without replying to each reader individually. He covers the whole subject of wireless reception well practically from the beginning in a question and answer conversational style without spoiling continuity or completeness. We agree with the author that radio is not an easy subject. Stripped of its mathematics, it becomes really difficult.

* * *

Shorter Notices

"Radio Upkeep and Repairs for Amateurs," by A. T. Witts (5s.); "Classified Examples in Electrical Engineering," Vol. I, d.c., by S. Gordon Monk (2s. 6d.); "Modern Polyphase Induction Motors," by F. Punga and O. Raydt (21s.); and "Technical Thermodynamics," by Prof. Dipl.-Ing. W. Schüle (£2). Sir Isaac Pitman & Sons, London.

"Electrical Properties of Glass," by J. T. Littleton and G. W. Morey (18s. 6d.); "Liquid Dielectrics," by Dr. Andreas Gemant (18s. 6d.); and "Physical Mechanics," by R. B. Lindsay (21s.). London: Chapman & Hall.

"The Wireless Constructor's Encyclopædia," by F. J. Camm. Second edition. Pp. 392; figs. 490. London: George Newnes, Ltd. Price 5s. This second edition contains particulars of quiescent push-pull, "Class B" amplification, iron-core tuning coils, metal valves, &c. About twenty pages are devoted to television.

Great Britain's Electrical Exports in 1932

THE annual statement for 1932 of the export trade of the United Kingdom has just been published. It gives under a much more detailed classification than the monthly accounts the countries of destination of the goods shipped. From this statement we have extracted the following figures showing the values of the principal items of electrical goods and apparatus and machinery exported last year. Increases or decreases compared with 1931 are added where available, but as some alterations in the classification have been made comparisons are not always possible.

	£ (Thous.)	Inc. or dec. £ (Thous.)
Goods and Apparatus		
Wires and cables, rubber insulated (not telegraph or telephone)—		
Total	622	− 70
To India	149	+ 6
„ South Africa	84	− 43
„ Australia	141	+ 60
„ New Zealand	33	− 13
„ Irish Free State	24	− 14
„ Argentina	8	− 28
„ China	25	− 2
„ Greece	6	− 11
„ Portuguese E. Africa	17	+ 1
Wires and cables insulation other than rubber (not telegraph or telephone)—		
Total	474	− 250
To India	132	− 54
„ South Africa	77	− 71
„ Australia	86	− 10
„ New Zealand	25	− 14
„ Portuguese E. Africa	35	− 1
„ Argentina	15	− 18
„ China	11	− 3
„ Straits Settlements	17	− 16
„ Irish Free State	4	+ 1
Telegraph and telephone wires and cables (not submarine)—		
Total	223	− 246
To New Zealand	19	− 37
„ South Africa	29	− 28
„ India	19	− 23
„ Australia	34	+ 17
„ Argentina	5	− 77
„ Brazil	3	− 10
„ Portugal	15	+ 9
„ Rumania	22	+ 4
„ China	6	− 40
Submarine telegraph and telephone cables—		
Total	131	− 38
To U.S.A.	14	− 32
„ France	66	+ 22
„ Denmark	29	− 10
„ Spain	11	− 2
Radio receiving sets (except valves)—		
Total	159	+ 63
To Irish Free State	30	− 2
„ Holland	24	+ 23
„ Belgium	13	+ 5
Radio transmitting apparatus (except valves)—		
Total	143	− 31
To British E. Africa	14	− 5
„ India	6	− 12
„ S. Rhodesia	1	− 13
„ Italy	36	+ 6
„ Brazil	12	+ 12
Radio valves—		
Total	360	+ 97
„ Irish Free State	22	+ 4
„ Australia	24	− 16
„ France	79	+ 31
„ Belgium	52	+ 28
„ Italy	11	+ 2
„ Argentina	15	—
Other radio parts and accessories—		
Total	382	+ 46
To Irish Free State	25	− 4
„ India	28	+ 3
„ South Africa	14	− 6
„ Australia	11	− 3
„ Italy	21	− 27
„ Holland	51	+ 25
„ Belgium	25	+ 3
„ France	42	+ 20
Other telegraph and telephone instruments and apparatus—		
Total	670	− 525
To South Africa	152	− 105
To Australia	21	− 35
„ India	38	− 17
„ Canada	11	− 40
„ Poland	40	− 16
„ Argentina	45	− 87
Lamps, 20 V and over, gas-filled—		
Total	197	+ 7
To India	37	− 1
„ South Africa	37	+ 8
„ New Zealand	27	+ 1
„ Australia	11	− 14
„ Irish Free State	27	+ 6
„ Argentina	12	+ 2
Lamps, 20 V and over, other—		
Total	151	+ 10
To India	27	− 6
„ Australia	15	− 11
„ New Zealand	33	+ 10
„ South Africa	27	+ 5
Batteries, primary, for flash lamps—		
Total	32	+ 14
Other primary batteries—		
Total	147	+ 39
To South Africa	17	− 4
„ Irish Free State	17	− 1
„ India	21	+ 5
Accumulators, portable—		
Total	286	− 35
To India	62	− 2
„ Canada	20	− 20
„ Irish Free State	20	− 3
„ South Africa	15	+ 3
„ New Zealand	11	+ 5
„ Australia	4	—
„ Denmark	26	− 14
Accumulators, stationary—		
Total	177	− 80
To India	39	− 15
„ South Africa	21	− 3
„ Irish Free State	17	− 5
„ Holland	17	− 23
„ Belgium	12	− 4
Ammeters, voltmeters, etc.—		
Total	107	+ 5
To India	23	+ 2
„ South Africa	14	+ 1
„ Australia	7	—
House service meters—		
Total	106	− 20
To South Africa	14	—
„ India	22	+ 10
„ Greece	24	− 21
Total of electrical goods and apparatus (including unspecified)—		
Total	5,785	− 1,653
To Irish Free State	330	− 41
„ South Africa	683	− 271
„ Australia	455	+ 20
„ New Zealand	323	− 56
„ Canada	81	− 62
„ British W. Africa	35	− 22
„ Sweden	96	− 66
„ Belgium	151	—
„ France	294	+ 8
„ Italy	167	− 27
„ Argentina	168	− 312
Machinery		
Generators, above 200 kW—		
Total	274	—*
To India	24	—
„ South Africa	16	—
„ Australia	36	—
„ Soviet Russia	105	—
„ Poland	20	—
„ China	27	—
Generators, not above 200 kW—		
Total	164	—*
To India	42	—
„ South Africa	7	—
„ Canada	6	—
„ Australia	11	—
„ Soviet Russia	25	—
Motors, railway and tramway—		
Total	64	− 17
To India	—	− 7
„ Brazil	4	+ 3
„ Argentina	8	− 41
„ Uruguay	27	+ 14
Motors, other, above 250 h.p.—		
Total	246	—*
To India	12	—
„ South Africa	32	—
„ Australia	8	—
„ Irish Free State	6	—
„ China	10	—
„ Soviet Russia	152	—
Motors, other, not above 250 h.p.—		
Total	480	—*
To India	81	—
„ South Africa	51	—
„ Australia	28	—
„ New Zealand	26	—
„ Canada	39	—
„ Poland	21	—
„ France	12	—
„ Soviet Russia	60	—
„ Argentina	13	—
„ China	18	—
Convertors and transformers, static—		
Total	530	+ 119
To Canada	62	− 9
„ New Zealand	31	− 27
„ South Africa	118	+ 79
„ Australia	2	—
„ India	56	+ 12
„ Hungary	8	− 12
„ Soviet Russia	105	+ 91
„ Spain	4	− 2
„ Palestine	1	− 5
„ Argentina	4	− 2
„ Brazil	16	+ 14
Switchgear—		
Total	713	—*
To Argentina	16	—
„ Brazil	13	—
„ France	23	—
„ Soviet Russia	50	—
„ Hungary	11	—
„ China	17	—
„ India	266	—
„ South Africa	137	—
„ New Zealand	22	—
„ Canada	20	—
Motor starting and control gear—		
Total	547	—*
To Soviet Russia	152	—
„ France	40	—
„ Hungary	29	—
„ South Africa	33	—
„ India	130	—
„ Australia	19	—
Vacuum cleaners—		
Total	34	+ 1
To Irish Free State	16	− 1
Electrical machinery not elsewhere specified—		
Total	622	− 67
To India	136	− 8
„ South Africa	38	− 19
„ Soviet Russia	142	+ 81
„ France	24	− 12
„ Argentina	11	− 23

* Comparative figures not available.

Electricity in Mysore

ONE of the highest waterfalls in the world—that at Gersoppa, a vertical cataract of 960 ft.—is to be harnessed to provide electric power for the working of the mines of Mysore. The Government of Mysore was a pioneer of hydro-electric development in India, the Cauvery power scheme being started in 1899 and opened in 1902 with an initial installation of 6,000 h.p. This was the first long-distance transmission scheme in India; its object was to supply power to the Kolar goldfields, situated at a distance of ninety-two miles from the generating station at Sivasamudram.

Since then six further installations have been carried out. The recent completion of the seventh installation raised the total capacity to 46,000 h.p. The eighth section is now being proceeded with. The pipe line, forebay equipment and generator are on the way to India and the turbine will follow in a few weeks. As the hot weather discharge of the river was uncertain and insufficient to ensure anything above the original amount of 6,000 h.p., the Krishnara Sagara Dam was constructed across the river Cauvery. Its lake of forty square miles safeguards the supply of water required for any likely demand for electrical energy and also provides water for a network of irrigating canals, the Irwin Canal alone commanding an area of 120,000 acres. Power from the Cauvery hydro-electric system is now being supplied for the construction of the Metur Dam in the Madras Presidency, also across the River Cauvery.

Electrical energy is freely used for many industrial undertakings. There are also many small equipments for pumping from wells for irrigation for fruit gardens. Outside the large cities of Mysore and Bangalore, rural electrification is making rapid progress. The present Dewan has set himself the task of making electricity available to all, and Mysore is said to be the only city in India where even the poorest can afford its advantages. The Director of Industries and Commerce is empowered to make advances to selected individuals towards the initial cost of installations for rural undertakings. Power is now supplied at one anna per kWh.

It is said that India imports annually distribution transformers to the value of three-quarters of a million sterling. The Government of Mysore has now started making transformers, the materials for which are purchased in England. The cost of such materials amounts to about 40 per cent. of the total cost of the transformer, and hence, 60 per cent. of the cost can be expended locally in assembling the components.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Britain's Industrial Future

Sir Holberry Mensforth, K.C.B., chairman of Edmundson's Electricity Corporation, Ltd., and the S.W. & S. Power Co., was the principal guest and speaker at the Batti-Wallahs' luncheon held at the Hotel Metropole, W.C.2, on October 26th. Mr. W. Lang, the president, occupied the chair. In the course of a brief address, Sir Holberry Mensforth said that he had been working for nearly fifty years, and in that period had seen a revolution in industrial production. He quoted several examples to illustrate the tremendous progress which had been made. For instance, the early Otto-Langen engines weighed three tons per h.p.; the engine which won the Schneider Cup race weighed only 11 oz. per h.p. Similar rapid advance had been made in turbine construction and design. The speaker mentioned that he had been concerned with the installation of the first Rateau impulse turbine installed in this country—at the L.C.C. power station, Greenwich.

Sir Holberry asked whether it was still true to say that the man who made two blades of grass grow where one grew before was a public benefactor. The tenet that the increased use of machinery did not cause unemployment could only be regarded as true nowadays upon the assumption that labour was infinitely flexible. It was very doubtful whether workers displaced by the introduction of machinery in an industry would find work in the industry which produced that machinery. What was in front of us? Were utilisation methods going ahead at the same rate as production? In his view it was impossible for a country like Great Britain to endeavour to compete in the mass production of goods. There were no better craftsmen than the British, and we would be well advised to concentrate upon the production of high-quality articles. He doubted whether any other country could have built the national grid so well and so quickly. The experience gained by our manufacturers in this direction had put them in a position far ahead of foreign competitors in the ability to supply extra-high-voltage apparatus.

In conclusion, Sir Holberry said it appeared to-day that in order to force mass-produced goods upon an unwilling market we were employing too many men on the lines of communication, while the number of those with the bayonets was being reduced. A vote of thanks to the speaker was moved by Col. Sir Thomas Purves, O.B.E.

The next luncheon of the Society is to be held on November 29th, when Sir John Marriott, M.P., will deliver an address on "Population and Prosperity." It is also intended to exhibit a quaint document entitled "Directions for Working Electric Light Apparatus," issued by the Orient Steam Navigation Co. to "Batti-Wallahs" of the s.s. *Chimborazo*, dated 1882. This has been presented to the Society by Mr. A. M. Sillar, who got it from Mr. Killingworth Hedges, who designed the electrical equipment of this ship—the first to have semi-incandescent lamps.

A section of the new Folkestone showrooms

Greek Orders for England

The Under-Secretary of State in the Greek Ministry for Communications, according to the *Frankfurter Zeitung*, is leaving for London to enter into negotiations with regard to the placing of orders with various electrical firms in England. These include the Power and Traction Finance Co. with reference to the electrification of the railway between Athens and Kiphissia, and the Eastern Telegraph Co. and the Marconi Co. regarding the establishment of wireless stations.

Electrical Manufacturing Activity

The B.E.A.M.A. Index of Activity for September gives a figure of 65.2 (1924=100) against 64.1 in August and 58.9 in September, 1932.

For Sale

The Irish Free State Electricity Supply Board has for disposal gas engines, a motor generator set, and other electrical plant.

Whitby U.D.C. has for sale two Brush-Ljungstrom turbo-alternators, &c.

Salford Corporation has for sale transformers and circuit breakers.

(See our classified advertisements.)

Australian Marking Regulations

Regulations have been issued by the Australian Minister for Customs which require that the country of origin shall be marked on certain imported goods. These include electrical goods generally. To enable importers to arrange with their suppliers for compliance with the new requirements, the regulations will not take effect until February, 1934. Incandescent lamps of general lighting service types will also have to be marked with the rated wattage and voltage.

Folkestone Company's Showrooms

The Folkestone Electricity Supply Co., Ltd., has just opened two new showrooms, the larger of these, which is the main showroom for the company's area, being at 59, Sandgate Road, Folkestone. This is a spacious modern building, containing a completely equipped demonstration kitchen, approached by a staircase, where several distinctive types of enclosed lighting units are displayed, as well as a range of modern cookers, water heaters, refrigerators, washing machines and other labour-saving devices, and a platform from which are given cooking demonstrations. There is also a bathroom, equipped with a water heater and towel rail, illuminated mirror and suitable lighting units. The ground floor has a display window illuminated by hidden reflectors; through this a view is obtained of the range of fittings and appliances. On this floor, at the rear, is the information and cashier's counter. A special feature of the showroom is a gallery coinciding with this counter in line and design, resulting in a very pleasing architectural effect. This gallery is intended for occasional special feature displays of the latest electrical apparatus. The offices of manager and staff are at the rear of the gallery next to the kitchen. The showroom at Hythe is fully equipped with a range of modern domestic electrical appliances and fittings.

Public Speaking and Electricity

The British Electrical Development Association arranged an interesting evening at Caxton Hall on October 25th, when, as a part of the Public Speaking Competition which is being organised, Mr. Elliott Stone lectured on "The Art of Public Speaking." Mr. Stone is giving further lectures on this subject on November 22nd and December 20th.

The E.D.A. Council, as a result of representations made, has now decided to extend the Public Speaking Competition to everyone employed in the electrical industry. Anyone wishing to enter the competition who has not received a copy of the booklet "E.D.A. 1187," describing the organisation and rules, should write for a copy to the E.D.A. Area office, or direct to the head office, 2, Savoy Hill, W.C.2.

In connection with the Public Speaking Competition, short talks on "How I Would Improve the Service of Hackney Electricity" were given by members of the staff of the Hackney Electricity Department at the Hackney Electricity Demonstration Hall on Monday evening last. Further talks are to be given at a meeting which is being held this evening (Friday) at the Demonstration Hall, at 8 p.m.

World Radio Trade

The situation of the world radio industry was discussed in a recent issue of the *Frankfurter Zeitung* by Dr. Gunther Lehmann of Horn, departmental manager of the Union of the Wireless Industry (Verband der Funkindustrie). Calculating the world exports of wireless apparatus at a value of only 200 million marks in 1932, Herr Lehmann states that this represents a decline of about 100 million marks as compared with 1931. The diminution in the world exports last year is stated not to have been uniform. As compared with 1931 the United States showed a decline of over 40 per cent. and Germany one of 43.5 per cent. The positions of the United States and

Holland have been reversed. Holland has moved to the first place with 33 per cent. of the world export trade, the United States takes second place with 28 per cent., while Germany maintains her position at 22 per cent. as in 1931. Great Britain's share in world exports was 8 per cent. The author estimates that prices decreased by 20 per cent. as compared with 1931. With regard to the situation in Germany in particular, Herr Lehmann gives a table of Germany's exports of radio-telegraph and telephone apparatus in which he shows that the total value of exports to all countries amounted to 78,204,000 marks in 1930 and 78,216,000 marks in 1931, falling to 44,294,000 marks in 1932. To Great Britain alone the German exports fell from 12,047,000 marks in 1931 to 1,512,000 marks last year. Coming to the current year, Herr Lehmann gives a tabular statement showing that the value of the German exports of radio apparatus declined from 17,319,000 marks in the first half of 1932 to 12,379,000 marks in the corresponding period in 1933. Included in these statistics are figures of the exports to Great Britain, the tonnage of which receded from 116.9 tons to 52.3 tons and the value from 622,000 marks to 296,000 marks.

Recent Contracts

The General Electric Co., Ltd., has received an order from the Johannesburg Municipality for a 10,000-kW high-pressure turbo-alternator, together with the necessary condensing plant. This order has been obtained in face of severe foreign competition.

It is announced that the Brush Electrical Engineering Co., Ltd., has secured the order for the two transformers from the Kettering Urban District Council to supply Stewarts & Lloyds' new iron and steel works at Corby. The two units will each be 11,000 kVA, three-phase, 50-cycles, 33/11-kV, fitted with remote control "on-load" tap-changing gear.

Irish Free State Electrical Imports

A slightly more active tone prevailed in the electrical trade in the Irish Free State during August last, the imports of electrical machinery, fittings, and cognate apparatus attaining a value of £65,692 as compared with £41,097 in August, 1932. The appended table gives details of the aggregate imports during the first eight months of the current year and shows an increase of £47,721, or nearly 10 per cent.

	January—August. 1932.	1933.
	£	£
Electrical machinery	123,451	144,839
Electric wires and cables	82,231	41,166
Wireless sets and parts	103,790	122,249
Electric lighting accessories, fittings and parts	30,857	25,694
Other electrical goods	91,425	150,747
Copper wire	6,380	1,159
	£438,134	£485,854

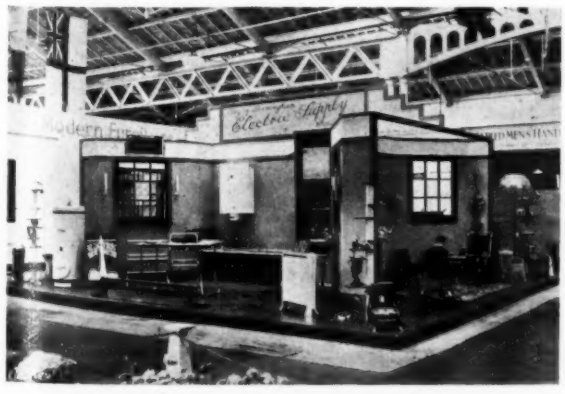
As will be seen the main advances are in machinery, radio material and miscellaneous electrical goods.

Diaries for 1934

We have received from Messrs. Iliffe & Sons, Ltd., copies of the 1934 issue of *The Motor Cycle*, *The Wireless World*, and *The Autocar* diaries. The first is bound in dark blue leather cloth and the other two in dark red. In addition to the usual general information, these diaries contain a good deal of information and data of interest to motor car, motor cycle and wireless enthusiasts. They can be obtained from the publishers or from booksellers and stationers at 1s. 6d. net.

Electricity at a Birmingham Exhibition

At the Domesticities Exhibition held in Bingley Hall, Birmingham, from October 17th to 28th, the Birmingham Corporation Electric Supply Department had a display entirely



A domestic electrical appliance exhibit at Birmingham

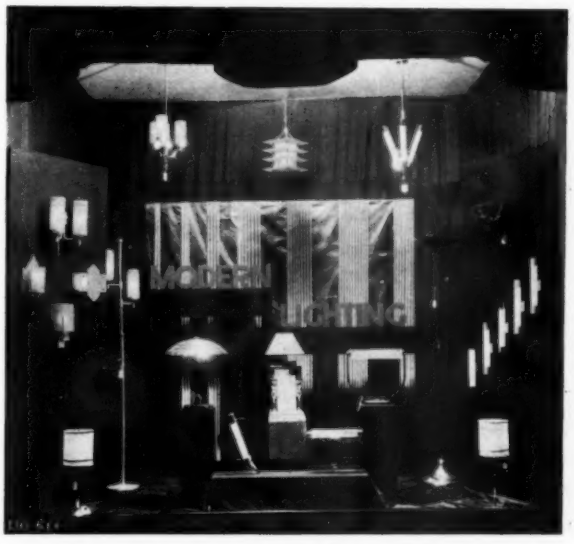
devoted to modern electric lighting fittings, fires, cookers, and other domestic labour-saving devices. The attractive layout of the stand is seen in the accompanying illustration.

New French Company

In connection with the settlement of the patent matters in relation to radio between French and German makers, referred to in our issue of September 22nd last, we learn that under the auspices of the Compagnie Française pour l'Exploitation des Procédés Thomson-Houston and the Compagnie Générale de Télégraphie sans Fil, of Paris, a new company has just been formed in that city (41, Rue La Boetie) with the title Consortium des Brevets Français Radio (B.F.R.) to exploit the radio patents of the two concerns.

A Modern Lighting Fitting Display

In the accompanying illustration we show a display of modern lighting fittings recently arranged in the window of



A display of modern lighting fittings at Wolverhampton

the Wolverhampton Corporation Electricity Department. In sending us the photograph Mr. T. A. G. Margary, the borough electrical engineer and manager, states that a great deal of interest was created by the display.

A Belgian Guide to Domestic Appliances

The Comité Electrotechnique Belge, of Brussels, has recently published a work setting out the features that should be incorporated in electrical domestic appliances in order that they may properly meet the requirements of users. The book comprises nine chapters devoted to definitions and conventions; a description of the tests to which appliances may be subjected; connectors; switches; water heaters; irons; open-fire cooking apparatus and plate warmers; cooking stoves and baking ovens; and finally radiators and electric fires. The purpose of the work is to stimulate Belgian manufacturers of electrical domestic appliances to improve the quality of their productions.

"End of the S.E.D."

Under this title the *Electrical World* reports the decision to wind up the Society for Electrical Development, the prototype of our British Electrical Development Association. Our contemporary says that the decision "comes several years too late, but is none the less welcome. It was a reproach to the name of co-operation and a scandal in the industry that, having failed to accomplish anything in their final effort to make the S.E.D. a co-ordinating agency and an industry forum, the four national associations [power companies, manufacturers, wholesalers and contractor-dealers], did not face their failure, admit it and have done. To let the society drag along powerless but pretending was not only a waste of money but a discouragement to the vital cause of co-operation. The passing of the S.E.D. is no repudiation of the ideal for which it was formed. It simply means that the machinery which men set up to promote it has broken down. And it has broken down, not for lack of opportunity nor the loyalty of many men, but fundamentally because the dominant branch of the industry has not yet been ready to take its place in the harness of this four-horse team and start down the road with the industry's load. And perhaps this is just another way of saying that the S.E.D. has never set up sufficiently comprehensive and appealing programs to capture this support and to weld the industry solidly together behind these objectives."

Social Event

The G.E.C. Dramatic Society will present *Dear Brutus* by Sir James Barrie at the Conway Hall, Red Lion Square, W.C., on November 16th and 17th at 8 p.m.

A Large Neon Sign

The new neon sign which has just been erected on the premises of Messrs. Ben Evans and Co., Ltd., Swansea, is one of the largest signs of its kind erected in this country. A "Staybrite" steel sign with script characters and a double outline stencil, it is 38 ft. in length overall. The capital letters are 6 ft. 9 in. high, and the smaller letters 4 ft., and it is fitted with 500 ft. of neon glass tubing. Fifteen transformers have been erected. Underlining the name of the firm

is a "Staybrite" steel tail 24 ft. long. The sign is lighted in red neon tubing and the letters that go to spell "Ben Evans, Ltd.," are illuminated one by one, followed by an interval of 30 seconds when the name of the firm is flashed out in full. The work has been carried out by Violite, Ltd., on behalf of the Westward Electrical Co. (1928), Ltd., Swansea.

French Domestic Electrical Apparatus Trade

The appended table shows the French imports and exports of domestic electric apparatus during the six months ended with June last as compared with the corresponding half of 1932. It will be seen that both the imports and the exports continued to feel the effect of the general industrial depression.

	Imports. Jan.-June, 1932. fr.	Imports. Jan.-June, 1933. fr.	Exports. Jan.-June, 1932. fr.	Exports. Jan.-June, 1933. fr.
Electric heating stoves and apparatus	2,357,000	2,001,000	1,400,000	1,480,000
Electric irons	115,000	68,000	110,000	113,000
Vacuum cleaners	3,791,000	1,995,000		
Refrigerating machines ...	7,827,000	1,922,000	3,939,000	2,887,000
Electric fans	764,000	499,000		
Totals (fr.)	14,854,000	6,485,000	5,449,000	4,480,000
Total (at 80 fr. to the £)...	£185,675	£81,062	£68,112	£56,000

The chief feature of the import side is the decrease in the imports of electrical vacuum cleaners and refrigerators. As regards the exports, it will be seen that there was a slight increase in cooking and heating stoves and also in electric irons.

Trade Announcements

Messrs. F. Hulme & Co., Ltd., whose registration was reported in our last issue, are to carry on the old-established business of O'Brien & Hulme, 78, George Street, Manchester. The directors' address is Ivy Lodge, Skaife (not "Sharpe" as stated) Road, Sale, Ches.

Messrs. F. Morecroft & Sons, wireless and electrical contractors, have opened new premises at 100, High Street, Dover.

Morris Commercial Cars, Ltd., has reduced the prices of a number of its four-cylinder normal control vehicles.

E.R.A.'s New Address

The British Electrical and Allied Industries Research Association has moved its offices to 15, Savoy Street, London, W.C.2 (telephone, Temple Bar 7907, 7908 and 7909).

Prices of Materials

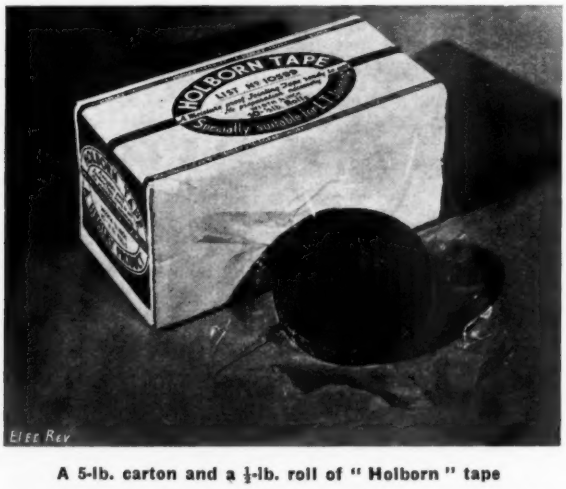
Messrs. F. Smith & Co. report, November 1st: Copper (electrolytic) bars and sheet, no change. Ditto, ditto, wire rods, £45 10s., 10s. inc. Ditto, Ditto, h.c. wire 7$\frac{3}{16}$d., $\frac{1}{16}$d. inc. Silicium bronze wire 8$\frac{5}{16}$d., $\frac{1}{16}$d. inc.

Messrs. James & Shakespeare report, November 1st: No change in the price of copper bars (best selected), sheet and rod, and English pig lead.

Messrs. Edward Till & Co. report, November 1st: India-rubber, para fine, 4$\frac{3}{4}$d., $\frac{1}{4}$d. decrease.

"Holborn" Tape

"Holborn" tape is a new l.p. pre-impregnated, moisture-proof jointing tape introduced by Messrs. W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, London, E.C.1. It consists of a selvedge cotton tape, $\frac{3}{4}$-in. wide, which has been thoroughly dried and impregnated in a slightly adhesive insulating compound. It avoids the necessity of impregnating plain cotton tape in a special compound on site and also does away with the special utensils required to heat the compound and wire sieves to protect ordinary cotton tape from burning.



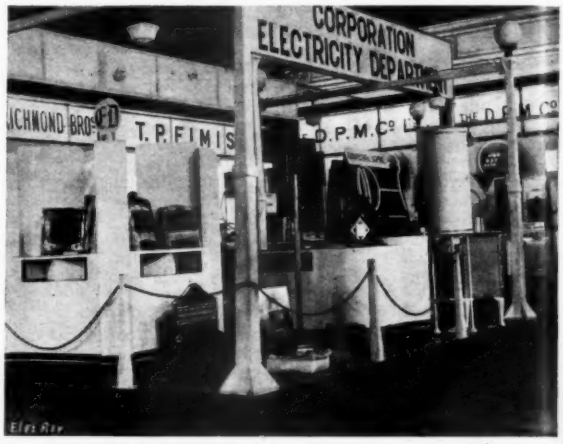
A 5-lb. carton and a $\frac{1}{2}$-lb. roll of "Holborn" tape

"Holborn" tape, which is applied cold, also avoids the discomfort in handling hot compounded tape and saves the wastage of surplus compound and tape. Being moisture-proof, it is ready for immediate use—no application of heat being necessary and it is treated so that successive layers adhere sufficiently to ensure that they remain in position—at the same time it is not sufficiently sticky to cause inconvenience or discomfort in handling.

Breakdown tests were undertaken in the Henley research laboratories at Gravesend and figures of over 33 kV 3-phase were obtained on a number of four-core l.p. joints. The cartons contain ten $\frac{1}{2}$-lb. rolls; a $\frac{1}{2}$-lb. roll measures practically thirty yards.

A Dundee Electricity Department Exhibit

At the local Traders' Exhibition held in Dundee from October 11th to 21st, the Corporation Electricity Department had an attractive stand on which was displayed a wide range of domestic electrical appliances. In addition to the Department's stand, Mr. D. H. Bishop, the general manager and engineer, informs us that there was a miniature Lighting Service Bureau which was set up in one of the smaller rooms at Caird Hall for demonstration purposes. This Bureau was



The Dundee Electricity Department's display

under the direction of Mr. Catten, district engineer to the Scottish Lighting Service Bureau, and short talks and lectures were given to the public, while special meetings were held for architects and members of the electrical industry. Propaganda films lent by E.D.A. were also shown during the run of the exhibition. Over 3,000 people visited the Bureau and the Electricity Department's stand.

American Domestic Electrical Appliance Exports

The general trade depression has so far this year had a further serious effect on the overseas demand for American domestic electrical appliances. The appended table shows the exports of such goods from the United States during the six months ended with June last as compared with the corresponding half of 1932, from which it will be seen that there was a decline of £156,396, or about 26 per cent.

	January. 1932. No.	January. 1932. Value £.	June. 1933. No.	June. 1933. Value £.
Fans	20,460	30,792	13,232	17,666
Household refrigerators ...	22,758	403,830	22,278	317,708
Washing machines	4,053	32,503	1,440	12,866
Irons	41,433	12,531	34,737	6,902
Cooking ranges	866	12,131	735	11,336
Vacuum cleaners	20,916	51,743	18,241	28,581
Other appliances	57,213	23,953	45,427	16,028
Totals ...		£567,483		£411,087

New Catalogues and Lists

George Cohen, Sons & Co., Ltd., 600, Commercial Road, E.14.—The October stock list of second-hand reconditioned a.c. and d.c. motors.

English Electric Co., Ltd., Stafford.—A number of illustrated publications dealing with the new "Z" type controller form "D.B.1," for tramcars (Q.40), automatic reclosing equipment (Q.41), price list of motor starters up to 100 h.p., 3-phase, 50-cycles (Q.42), turbo-alternators (Q.43), and a handle-type cartridge fuse (Q.45).

Wallace Electrical Co., 9-9A, George Street, Manchester Square, W.1.—A net trade catalogue of "E.L.M.A." lamps, electrical accessories, heating and domestic appliances, radio sets, batteries, &c.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—New and revised leaflets superseding existing sheets in the company's catalogue binders.

Ward & Goldstone, Ltd., Pendleton, Manchester.—A leaflet containing details of the "Goltone" screened air-spaced flexible down-lead.

Holden & Brooke, Ltd., Sirius Works, Manchester.—A brochure giving illustrated particulars of "Quick Access" pumps of split casing design. Also a pamphlet describing type "G.C.S." centrifugal pumps.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.—A coloured broadsheet and folder giving particulars and prices of "Tricity" fires and "Tricity Sunray" equipment.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow. Pamphlet No. C2/1A, covering a range of industrial switchgear, control gear and accessories.

Harken Electrical Co., Ltd., 18a, South End, Croydon.—A descriptive leaflet relating to the "Empire" 5-valve "Class B" battery-operated receiver.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.—An adhesive window announcement advertising "Osram" motor car bulbs.

The Electrical Equipment & Carbon Co., Ltd., 107/111, New Oxford Street, W.C.—Pamphlets illustrating the "Megometer" insulation testing set, and mercury-arc rectifiers.

Trevelyans (Birmingham), Ltd., Bracebridge Street, Birmingham.—A leaflet illustrating a new pattern electric hand lamp.

J. G. Statter & Co., Ltd., 16, Great George Street, Westminster, S.W.1.—Leaflet No. 219 describing the new type "M.O." ironclad oil-immersed star-delta starter and oil switch.

C. C. A. (Vacuum Cleaners), Ltd., 101, Bunhill Row, E.C.—An illustrated folder giving brief particulars of the new "Silo-Baby" vacuum cleaner.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.—Publication No. H.G.926 of "Ediswan" electrical accessories for the home, and H.C.935 relating to electric automatic safety kettles.

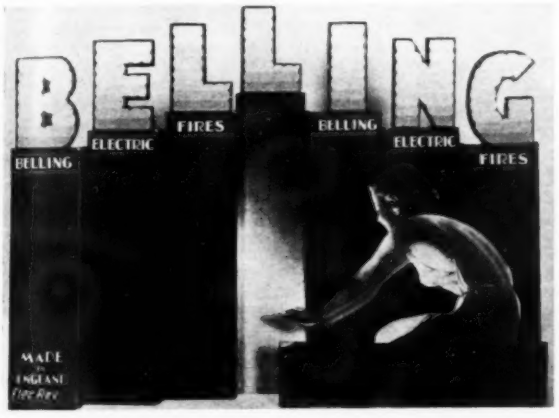
Archibald Low & Sons, Ltd., Merkland Works, Partick, Glasgow.—Leaflet H.W.33/4 dealing with immersion heater outfits, Nos. 1 to 20, list L.33a giving particulars of smaller domestic appliances, and pamphlet M.3 dealing with tubular heaters.

L. P. S. Electrical Co., Ltd., Ealing Road, Alperton, Mddx.—Lists of radio wires, cords and flexibles, and aerial wire.

Frank Whitelegg, 35, Union Road, S.E.—Circulars drawing attention to coil winders and wire working machinery, and an illustrated leaflet of special testing machines and appliances.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.—A composite folder giving particulars of superhet. radio-gramophones and receivers.

Philips Lamps, Ltd., 145, Charing Cross Road, W.C.—A catalogue of commercial and industrial lighting fittings, including



This neat counter card now being distributed by Messrs. Belling & Co. is a replica of a large background which forms the main feature of a window display appearing all over the country

many new types. Reductions in prices have been made. Also a priced leaflet of Philips lamps.

Turner (Nu-Este), Ltd., 4, Albert Square, Manchester.—An illustrated folder describing the "Nu-Este" machine for cleaning and polishing plate or sheet-glass windows, &c.

Edward White, Windsor Works, Redditch.—A leaflet containing illustrations of wire-working and concrete mixing machinery.

Rd. Johnson, Clapham & Morris, Jacem House, Trafford Park Manchester.—An illustrated price list of glassware and domestic lighting equipment.

Benjamin Electric, Ltd.—Tariff Road, Tottenham, N.—A well-produced and comprehensive catalogue (pp. 180), fully illustrating and describing the company's wide range of industrial and commercial lighting fittings. Also a brochure containing full details of the "Saaflux" reflector.

Bankruptcy Proceedings

J. D. Lister, trading in co-partnership as electrical and radio engineers, 56, Victoria Street, Littleborough, near Rochdale.—This debtor applied for his discharge recently at the County Court Buildings, Rochdale. It was reported that the receiving order was made this year. The Official Receiver said that in August, 1932, debtor purchased for £200 a half-share in a business. The partnership had been unsuccessful since the commencement, and debtor attributed his failure to local trade depression, insufficient turnover, depreciation of stock and loss in motor-car transactions. The total liabilities were stated to be £150. The discharge was granted subject to twelve months' suspension.

R. Weaver (trading as Dennis & James), electrician, 189, Regent Street, W.—The public examination of this debtor took place at the London Bankruptcy Court on October 25th before Mr. Registrar Warmington. He failed last July with total liabilities of £3,743 (ranking £2,901) and assets of £62 absorbed in the preferential claims. The debtor stated that he commenced business in September, 1923, in partnership with another. His partner retired in May, 1926, owing to ill-health, receiving the return of his capital and £150. Witness continued the business but incurred heavy losses on big contracts in connection with housing schemes. He further attributed his failure and insolvency to heavy overhead charges, trade depression, bad debts, inability to supervise work in hand personally, and to strikes of employés. The examination was concluded.

J. F. Creasey (trading as Positive Electric Co.), 673, Romford Road, Manor Park, and at Wanstead Park and East Ham, electrical engineer.—The first meeting of creditors was held on October 26th at London Bankruptcy Buildings before Mr. H. Wheeler, Assistant Official Receiver. The receiving order was made on October 12th upon the petition of Falk, Stadelmann & Co., Ltd. The debtor stated that he began business in 1915 with £50 capital at 673, Romford Road under the style of Positive Electric Co. by undertaking contracts for electrical installations for the East Ham Corporation. In January, 1930, he opened a branch for the sale of wireless apparatus, and in June, 1931, a further branch at Wanstead Park. In January last the East Ham Corporation opened electrical showrooms in Romford Road, since which time the Corporation had not only done its own installation work but had reduced the number of his private customers. In addition, he had found it almost impossible to compete against "cut price" firms in the wireless trade. In July last he executed a deed of assignment in favour of Mr. W. A. J. Osborne, acting for the general body of creditors, but the petitioning creditors dissented from the deed and instituted bankruptcy proceedings. The debtor further states that in February last he became a partner in a firm at Ilford, but notice of dissolution of the partnership to take effect next December has been given him by his partner. The liabilities are estimated at £4,600, against assets expected to realise £956. A resolution was passed for Mr. O. D. Manwaring, 50, Cannon Street, E.C., to act as trustee and administer the estate in bankruptcy, assisted by a committee of inspection.

A. Senior and **H. Senior,** trading in co-partnership as A. Senior & Son, Back North Terrace, Darlington, electrical contractors.—The public examination of these debtors was to have been held at the Court House, Bridge Road, Stockton-on-Tees, when a joint statement of affairs was submitted which showed gross liabilities of £329 and an estimated deficiency of £319. It was stated that Arthur Senior was unable to attend the Court owing to illness. His son, Harold Senior, said that in 1919 the business was commenced by his father, and he joined him about six years ago. The failure was attributed to bad trade and the ill-health of the elder debtor. The examination was adjourned.

E. H. Jones, electrician and radio dealer, Northcote Buildings, Undercliffe, Bradford.—The first meeting of creditors was held on October 20th at the Official Receiver's office, 71, Manningham Lane, Bradford. Debtor said that his position was due to losses in connection with hire-purchase transactions and ill-health. The statement of affairs showed gross liabilities of £587, of which £458 was expected to rank for dividend, whilst the net assets were £74. There was thus an estimated deficiency of £384. The case being a summary one was left in the hands of the Official Receiver, as trustee.

J. C. A. Willey, 12, Fernhill Road, Cowley, and 47 & 49, Cowley Road, Oxford, wireless engineer.—This debtor attended at the County Hall, New Road, Oxford, on October 23rd, for his public examination. He returned gross liabilities of £1,743, of which £813 was expected to rank for dividend, whilst the net assets amounted to £514. The failure was attributed to lack of capital and business experience, and general depression in the last season due to the fall in prices. The hearing was adjourned.

L. S. Green and **W. H. T. Green** (L. & H. Green), wireless dealers, 162, Great Colmore Street, Birmingham.—First and final dividend of 1s. 11¼d. in the £, payable October 24th at 159, Great Charles Street, Birmingham.

F. W. Westover, wireless dealer, 20, Woodbury Park Road, Tunbridge Wells.—Public examination, December 6th, at the Town Hall, Tunbridge Wells.

T. H. C. Hughes, electrical and wireless engineer, 1090, Manchester Road, Bradford.—Trustee, Mr. J. O. Morris, 71, Manningham Lane, Bradford, Official Receiver, released October 5th.

A. C. Gardner, wireless dealer, 7, Midland Road, Derby.—First and final dividend of 4s. 1¼d. in the £, payable November 3rd, at 22, Regent Street, Nottingham.

L. G. H. Cantle, wireless engineer, Woodbury Cottage, Woodland Grove, Oatlands Park, Weybridge.—Receiving order made August 4th, 1932, rescinded. Adjudication August 16th, 1932, annulled.

P. Kalis (trading as Ludgate Circus Radio), wire'ess dealer, 4, Ludgate House, Ludgate Circus, E.C.—The accounts lodged by this debtor at the London Bankruptcy Court show liabilities of £1,978 and assets nil.

Company Liquidations

Terrytone Radio Products Co., Ltd., 33, Crouch Hill, N.—The accounts lodged under the compulsory liquidation of this company show liabilities of £2,624, against assets of £612, and a deficiency of £2,112 with regard to contributories, the issued capital consisting of 100 ordinary shares of £1 each. The Official Receiver (the liquidator) reports that the company was formed in April, 1932, to acquire a business of manufacturers and dealers in radio apparatus, previously carried on by W. E. Duke. The failure of the company is attributed to heavy overhead expenses, cost of experiments, the purchase of components unsuitable for the company's receivers, and the making of chassis and cabinets which could not be used, and the expenses of the Wireless Exhibition at Olympia in 1932. In the opinion of the Official Receiver the failure is due to mismanagement.

Preston Radio & Electrical Supply Co., Ltd.—Winding-up voluntarily. Liquidator, Mr. C. W. Callow, 18, Winckley Square, Preston.

Hexham & District Electric Supply Co., Ltd.—Winding-up voluntarily. Liquidator, Mr. C. Skipsey, Carliol House, Newcastle-on-Tyne.

Private Arrangements

Contal Radio, Ltd., radio factors, late of New Inn Yard, Shoreditch, E.—A further meeting of the creditors was held on October 24th at the offices of Messrs. W. H. Cork & Co., 19, Eastcheap, London, E.C. Mr. W. H. Cork said that in March, 1932, the company entered into an arrangement to pay the creditors 5s. in the £. The first instalment of 2s. 6d. in the £ had been paid, but the other two instalments were still outstanding. The committee of the principal creditors had received an offer to pay a further 1s. in the £ in final settlement, but it was not prepared to accept this, and suggested that it should be increased to 2s. in the £. After discussion it was decided to accept a further 1s. 6d. in the £, payable within fourteen days, in settlement of the creditors' claims.

Electricity Supply

Lighting, Domestic, Power

Armenia.—ELECTRICAL PROGRESS.—During the last five years great changes have taken place in Armenia, reports *Reuter's Trade Service* from Moscow. Formerly, although abounding in water power, Armenia possessed only two small power plants, one at Erivan and one at Allaverdy; now the power resources of the region have been raised to several hundred thousand kW, the Leninakan, Erivan, Zhevan, Dilizhan, Igorin electrical plants and the first large hydro-electric plant, the 22,500-kW Dzoraget State plant, having been completed. The Sevan-Zaingsky 112,000-kW power station will soon be completed. About 36,200,000 roubles (£3,620,000) has been invested in recent years in the construction of electrical plant in Armenia.

Ashton-under-Lyne.—REDUCED CHARGES.—The Electricity Committee has reduced the hiring fee for electric radiators to 1s., 1s. 6d., and 2s. per quarter, for 1-, 2-, and 3-kW models respectively for a minimum period of one year, and the charge for electric breakfast griller-boilers, including installation, to 3s. 9d. per quarter for a minimum period of two years. In connection with after-hours shop window lighting, from 8 to 11 p.m., the tariff has been fixed at 1½d. per kWh, plus 5s. per quarter for meter and time switch.

Birmingham.—QUARTERLY PROGRESS REPORT.—There has been a net increase of 3,450 in the number of consumers during the quarter ended September 30th, the new connections aggregating 30,700 lamps in the lighting section and 10,100 h.p. in the power section. The electrical energy sold has increased by 11.68 per cent., as compared with the corresponding period of 1932. While there had been steady development of the demand for domestic purposes, the main part of this increment has been on the power side, which seems to indicate some improvement in industrial conditions in the area.

Bradford.—TRANSFORMER STATION.—The Electricity Committee is to erect a district transformer station at Clayton, at an estimated cost of £2,023.

Cambuskenneth.—A SUPPLY AVAILABLE.—A supply of electricity has been provided by the Scottish Midlands Electricity Supply, Ltd.

Cardiff.—COOLING TOWERS.—At a recent meeting of the Electricity Committee the engineer reported that having regard to the increased output at the power station it would be advisable to augment the cooling facilities. The Committee decided to ask the water engineer to report on the matter.

ELECTRIC PUMPING.—The Sewerage Committee is to install another electric pump at the western pumping station at an estimated cost of £3,600.

FURTHER CHANGE-OVER.—The Electricity Committee is to effect a further change-over in the town centre (£2,320).

Cheltenham.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a total estimated cost of £253.

Chesterfield.—EXTENSIONS.—The Town Council is to apply for sanction to a loan of £26,480 for developments, including £908 for a new e.h.p. cable to Brampton, £4,350 for a similar cable to Whittington Moor *via* Newbold, £783 for a cable to complete a ring main in the Hasland and Derby Road areas, £11,000 for mains extensions, and £9,000 for services.

Coventry.—APPARATUS FOR HIRE.—The Electricity Committee has prepared a scheme for the provision of electrical apparatus to be let out on hire.

Croft (Yorkshire).—TEES VALLEY SCHEME.—The Rural District Council has been informed by the North-Eastern Electric Supply Co., Ltd., that there is no prospect of supplying electricity to Cleasby and Stapleton until the summer of next year. These areas, states the company, were part of a scheme for the whole of the Tees Valley, which would be supplied by means of h.p. lines. There is little likelihood of electricity being available at Barton for a year or two.

Darlington.—REDUCED CHARGES.—At its next meeting the Town Council will be asked to approve a reduction in the electricity tariff.

Durham.—ELECTRIC HEATING OF SCHOOLS.—The County Education Committee is applying to the Board of Education for sanction to heat the Seaham Harbour Camden Square Intermediate Council School by electricity. The Board has sanctioned electrical installations at the Tow Law Junior Mixed Council School, Croxdale Council School, and the Tudhoe Colliery Council School.

East Ham.—LOAN.—The Town Council, after considering the question of financing the rental installation schemes, has referred the matter to the Finance and General Purposes Committee, with a view to application being made for sanction to a loan of £50,000.

SHOWROOMS.—The Council is to erect electricity showrooms at 703-5, Romford Road, Manor Park.

Eccles.—EXTENDED MAINS.—The Electricity Committee is to proceed with the laying of mains, &c., for the Haddon Road Housing Estate, and has placed orders for the necessary cables and is inviting tenders for the required transformer and kiosk. A sub-station is also to be erected in Bright Road.

"OSIRA" STREET LIGHTING.—The Committee has requested the General Electric Co., Ltd., to prepare a scheme and estimate of cost for the lighting of Church Street, from Eccles Cross to the public library, on the "Osira" system.

FIRES ON HIRE.—The Committee has decided that 2-kW Carron "Argus" fires shall be let on hire at a rental of 1s. 6d. per quarter.

Edinburgh.—ILLUMINATIONS.—It is proposed to floodlight various historical buildings between December 18th and January 2nd.

Falkirk.—POWER STATION CHANGES.—Mr. T. M. Climie, electrical engineer, recently reported to the Town Council that he had received from H.M. Electrical Inspector of Factories a communication with reference to the e.h.p. switchgear, recommending that the whole of the existing switchgear should be superseded; he further reported that he had taken up this matter with the manufacturers of the switchgear with a view of arriving at the cost, and he submitted an estimate for altering the existing switchgear at the generating station and at the various sub-stations, inclusive of erection labour costs, as follows:—Main switchboard—generating station, £2,455; sub-stations, £6,209; total £8,762. The matter has been remitted to a sub-committee.

Gainsborough.—ASSISTED WIRING SCHEME.—The Urban District Council has decided to introduce an assisted wiring scheme, with the installation of shilling-in-the-slot meters.

Glasgow.—PROGRESS DURING SEPTEMBER.—Ninety-six houses were wired in September under the Electricity Department's scheme, making the total to date 38,131, while hired appliances numbered twenty-six, making the total 17,469.

LOAN.—The Electricity Committee was informed at its last meeting that the Electricity Commissioners had agreed to sanction the borrowing of £250,000 for capital expenditure on mains and services and sub-station equipment.

MAINS EXTENSIONS.—The Committee has decided to lay distributing mains at a cost of £29,666.

SHETTLESTON AND TOLLCROSS SUPPLIES.—With regard to the Corporation taking over the whole supply of electricity in the Shettleston and Tollcross area from the Clyde Valley Electrical Power Co., the manager has reported to the Corporation Electricity Committee that the work would involve the laying of an e.h.p. ring main of standard size within the area. At the same time opportunity will be taken of laying the necessary l.p. cables, to reinforce existing l.p. cables, where such are overloaded, and preliminary arrangements will also be made for the provision of six static sub-stations. The Committee has approved the proposals, the aggregate cost of which is £36,056, and has authorised the manager to proceed with the work.

Guildford.—ASSISTED WIRING.—The Electricity Committee is seeking sanction to borrow £10,000 in connection with the assisted wiring scheme.

Hastings.—LOAN.—The Electricity Committee is seeking sanction to borrow £10,000 for sub-station equipment.

SUPPLY TO BROAD OAK.—The Committee is to provide a supply to Broad Oak at a cost of £295.

Hemel Hempstead.—SUPPLY TO FLAMSTEAD.—The Rural District Council has decided to offer no objection to Luton Corporation erecting an overhead line to supply electricity to Flamstead.

Japan.—POWER PROJECTS.—A message from our Yokohama correspondent states that the I.G.R. is considering harnessing the waters of the Titsu River and the erection of two 50,000-kW power stations at a cost of 10,000,000 yen. There is also a scheme afoot for additional projects on the Shinano River, as about 25,000 kW will be required on an electrified railway from Suita to Akashi and Otsu. The railway authorities are to undertake the development of the Tenryu River and propose to erect two 50,000-kW power stations at an estimated cost of twenty million yen. A 24,000-kW power station is also to be erected on the Jiniyoda River, the work being undertaken by the Sutitomo Company.

Kingston-on-Thames.—REVISED CHARGES.—The Town Council has adopted new charges for electricity used continuously for heating, viz., between 8 a.m. and 8 p.m., 3 kWh a penny, and between 8 p.m. and 8 a.m. ¾d. per kWh.

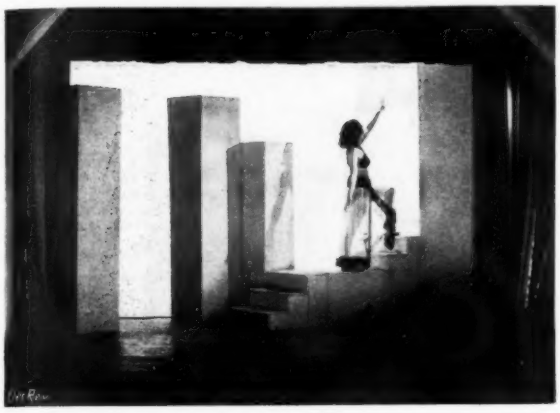
Littlehampton.—SALE OF UNDERTAKING.—The electricity problem was settled on October 25th, when the Urban District Council decided to accept the latest offer of the Sussex Electricity Supply Co., Ltd., in preference to exercising its purchasing rights and handing the undertaking over to Worthing. The purchasing proposal, which was the outcome of negotiations between the two Councils, had already been endorsed by Worthing, and it would in all probability have been ratified by Littlehampton had not the Supply Company come forward with an offer to reduce its charges below the rates now charged not only in Rustington and the other outside parishes supplied from Worthing, but even in Worthing itself. The company has further offered, conditionally on Littlehampton abrogating its purchase rights, to enter into an agreement whereby at no time will it increase its charges above those in force in Worthing, and any failure on the part of the company to carry out this agreement will immediately revive the Council's purchasing rights.

London.—HAMMERSMITH.—The Electricity Committee reports that the net profit from the sale of electricity during 1932-33 amounted to £36,739, and that from the sale of fittings was £10,929, making a profit of £47,668. During the year

3,535 wiring installations were provided on consumers' premises under the Council's assisted wiring scheme, bringing the total installations to 18,619. Under the scheme for the change of pressure of supply from 110 V to 230 V, a total of 2,454 installations were changed over, an increase of 778 during the year; the total expenditure incurred under the scheme being £12,665. The total number of consumers at the end of the year was 30,578, as compared with 27,225 a year previously, and the amount of electricity sold was 48,600,461 kWh, as compared with 43,392,450 kWh in the preceding year, the highest percentage increase in the history of the undertaking.

The Electricity Committee has obtained sanction to borrow £5,075 for mains and services.

STOKE NEWINGTON.—The Electricity Committee reports that 137 additional consumers have been connected to the mains, bringing the total to 31,156. It is recommended that an additional supply of electricity be furnished, at a cost of £314, to Purewite Laundry Services, Ltd., and also that the requisite wiring installations for electric cookers supplied on hire by the Council be provided free of charge to domestic consumers,



This week another lecture-demonstration dealing with colour-lighting for the stage and other purposes was held at the Holophane London headquarters. Our photograph shows one of the settings

up to a 30-ft. run, any additional length of wiring in excess of 30-ft. to be charged for at the rate of 2s. 6d. per yard run, and that the Council's resolution fixing a charge of £3 10s. for the execution of wiring installations for electric cookers supplied on hire by the Council be rescinded.

Maiden Newton.—PUBLIC LIGHTING.—The Parish Council has decided to adopt public lighting by electricity.

Manchester.—PROGRESS DURING SEPTEMBER.—The report of the Electricity Department for September has just been issued, and shows an increase of 2,371 kW in connections, bringing the total to 544,835 kW. There were 2,918 applications for supplies (including additional supplies) as compared with 2,036 during the previous month. Orders for the hire of cookers and wash-boilers amounted to 232 and 15 respectively, 200 and 23 being connected, making a total on circuit of 11,904 and 531.

Mansfield.—METERS.—The Electricity Committee is applying for sanction to borrow £10,000 for meters.

REDUCED TARIFFS.—The Electricity Committee recommends reductions in the charges for electricity as follows:—Lighting—maximum demand—from 8d. and 2d. per kWh to 7d. and 2d. per kWh; factories on demand rate for power—lighting amount charged at power rates to be increased from 10 to 12½ per cent. of the total used for power.

Morecambe.—NEW CABLES.—The Electricity Committee is to replace about nine miles of cables at a cost of £10,528.

Northern Ireland.—ELECTRICITY BILL.—The Electricity (Supply) Bill has passed its third reading in the Northern Ireland House of Commons. The purpose of the Bill is to give general application to certain provisions included in local Acts, and to make certain amendments in existing laws relating to electricity supply. On the motion of Mr. Nixon the Minister of Commerce incorporated a new clause giving authority to supply undertakings to make bylaws for the prevention of accidents in or to buildings through faulty, inferior, or unsuitable fittings, apparatus or workmanship. The general effect of the different clauses of the Bill is to aid and protect electricity supply concerns, particularly those operating in rural areas.

THE PORTRUSH UNDERTAKING.—The Urban District Council has considered a letter from the Antrim Electricity Supply Co., and Electricity Distribution Co., Ltd., Larne, asking if the Council would dispose of the local electricity undertaking before spending additional money on it. It was pointed out that the company's charge was 8½d. per kWh as against the Council's 8d., and it was decided to ask the company to submit an offer together with a scale of tariffs for lighting, power and public lighting.

Orlestone.—SUPPLY WANTED.—Residents at Hamstreet, Orlestone, Ruckinge, and Warehorne have decided to ask the Kent Electric Power Co. for a supply of electricity in the district.

Petersfield.—EXTENSIONS.—The Rural District Council has consented to the Portsmouth Electricity Department extending cables to Clanfield, and also to the Mid-Southern Utility Co. extending its overhead lines from Rake to High Bank, and at Liss to supply Council houses. There is also to be an extension of the underground cables at Liphook.

Plymouth.—LOAN.—The Electricity Commissioners have sanctioned the borrowing of £75,000 for mains and services, that amount being the approximate estimate of the expenditure during the next three years. The Committee has authorised extensions of cable in sixteen streets and roads.

Rawtenstall.—SUB-STATION.—The Electricity Committee is to erect a sub-station in Shawclough Road.

Rocester.—PUBLIC LIGHTING.—A supply of electricity has been provided by the Uttoxeter Urban Council, including energy for public lighting.

Scarborough.—LOANS.—The Electricity Committee is applying for sanction to borrow £40,000 for mains and services, £10,000 for meters, and £10,000 for hire apparatus.

Stoke-on-Trent.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to a loan of £40,000 for mains and services.

Thornton Cleveleys.—LOAN.—The local Council has decided to make application for sanction to borrow £2,000 for hire-purchase equipment.

Torquay.—EXTENSION OF AREA.—The Electricity Committee is seeking powers to extend the Corporation's area of supply to include Totnes and to purchase the undertaking owned by the Electric Supply Corporation, Ltd., for £17,000.

NEW SHOWROOMS.—The Electricity Committee is applying for sanction to borrow £30,000 for the erection of showrooms and offices.

Winchester.—OVERHEAD LINES.—The Mid-Southern Utility Co. has submitted to the Rural District Council plans for overhead l.p. lines at Itchen Stoke, Martyr Worthy, and Abbots Worthy, and of h.p. overhead lines between Alresford, Kilneston and Bramdean.

Traction

Australia.—MELBOURNE TRAMWAY SURPLUS.—The annual report of the Melbourne and Metropolitan Tramways Board, which we have received from the chief engineer, Mr. T. P. Strickland, shows a surplus for the year ended June 30th of £22,999, compared with a deficit of £41,261 in the preceding year. As, however, the Board has had to pay £108,218 into consolidated revenue on account of the Fire Brigades Board, the Licensing Fund, and the Infectious Diseases Hospital, there is actually a deficit of £85,219, compared with a deficit of £148,171 last year. The total revenue amounted to £1,929,738 and working expenses to £1,184,495. There was an increase of 1,771,873 in the number of passengers carried, the total being 163,694,945. Traffic receipts per mile were 21.025d., and the working expenses per vehicle mile, including power cost, were 12.963d., a decrease of 0.307d.

China.—CANTON.—It is reported that the Government of Canton intends to construct two tramway routes that will cut across the city from east to west. The materials, which will cost nearly £400,000, are to be purchased from England.

Germany.—TROLLEY-BUSES FOR BERLIN.—Preparations are in hand by the Berlin Traffic Co. for the establishment of the first service of electric trolley-buses in the Berlin district. The line will run between Spandau and Staaken, the contract for the installation of the necessary overhead conductors having been placed with the A.E.G. Co.

Ipswich.—NEW TROLLEY-BUSES.—Four new double-deck trolley-buses have been supplied to the Corporation by Messrs. Ransomes, Sims & Jefferies, Ltd., and are fitted with special coils to prevent interference to wireless reception. It is intended progressively to replace the present fleet of some fifty single-deck vehicles with buses of the new type.

Japan.—ANOTHER GOVERNMENT LINE TO BE ELECTRIFIED.—The I.G.R. are electrifying the Uyeno-Abiko section of the Joban line, for which the cost will be about 900,000 yen. The work of construction will be started at the end of the current fiscal year, and it will take about a year to complete it, reports our Yokohama correspondent.

L.M.S. Railway.—ELECTRIC LIGHT SIGNALLING.—Coloured searchlight signals which throw a penetrating beam under all conditions of weather, and which are being adopted by the L.M.S.R. at a number of points on its system, are being introduced as part of a scheme of signalling alterations to be carried out shortly at Dillicar, between Low Gill Junction and Tebay (Westmorland) on the main West Coast route from the South to Carlisle and Scotland. This scheme will enable the intermediate signal-box at Dillicar to be abolished, the present semaphore signals being dispensed with in favour of the colour-light signals states *Modern Transport*. The latter will be under the control of signalmen at Low Gill Junction and Tebay, electric operation enabling them to be worked over distances ranging from 1 mile 20 yd. to 1 mile 586 yd. The new signals are approach-lighted; this means that the lamps are not alight continuously, but are switched on by the train as it approaches them and switched off again when the train has proceeded a certain distance beyond the signals.

Manchester.—TRAFFORD PARK TRAMWAYS.—It is proposed that Manchester should take over the Trafford Park tramways if the City Council approves the terms agreed to by its Transport Committee and Trafford Park Estates, Ltd. A clause in the draft agreement binds the city to pay the company £4,800 a year for ten years. The Transport Committee's recommendation will come before the City Council for ratification on November 9th. It is also recommended that the Corporation shall have the right to abandon all or part of the tramway if it sees fit.

Metropolitan Railway.—NEW STATION.—Northwood Hills, the recently constructed station between Pinner and Northwood, is to be opened to traffic on Monday, November 13th.

Poland.—RAILWAY ELECTRIFICATION.—Several English engineers are expected in Warsaw at the beginning of November to start work on the technical details of the electrification of 125 miles of railway track, under the contract signed in August by the Polish State Railways with the Metropolitan-Vickers Electrical Co., Ltd., and the English Electric Co., Ltd. The constructional work is expected to begin in the summer of 1934. The purchase of materials will be divided between English and Polish electrical firms, and it is estimated that at least £900,000 will be spent in England. The work is expected to take four years to complete.—*Reuter* (Warsaw).

It is also reported that in addition to this contract the Polish Government has decided to spend 37 million zlotys on the conversion of various lines in Pomerania and round Poznan, and 100 million zlotys on the railways round Cracow and Tarnowice. The work is to be spread over ten years.

Rumania.—RAILWAY ELECTRIFICATION.—The State Railways have prepared complete estimates for the conversion of the 70-mile heavily graded main line from Ploesti to Brasov (Kronstadt) to electrical operation, and the proposals will be considered by the Government at an early date.

Russia.—ELECTRIC LOCOMOTIVES.—In a recent issue of *La Traction Electrique*, Mr. W. Konaloff gives some details of two Russian electric locomotives now in service on the Stalinissi-Zestaffoni section of the railway between Baku and Batoum in South Russia. The machines are mounted on two six-wheel bogies, each of the six axles being driven through gearing by a 460-h.p. motor operated by power at 1,350 V, at 605 r.p.m.

Sweden.—FURTHER ELECTRIFICATION PROPOSALS.—*Reuter's Trade Service* learns from Stockholm that the proprietors have recently concluded an investigation lasting some time into the cost of electrifying part of the main line of the railway system owned by the biggest private railway company in Sweden, Bergslagernas Jaernvaegs Aktiebolag. The line in question runs from Gothenburg to Aamaal, a distance of 164 km., and the cost is estimated at Kr. 10,100,000. The company is still hesitating because prospects regarding the price of coal and electric power are somewhat uncertain just now, making it difficult to ascertain whether electrification would mean a saving or not. The company will have to limit any electrification to part of its system, because it would not be able, if the whole system were electrified, to utilise its numerous up-to-date steam locomotives, which are too big to be sold to other private railways in Sweden.

Traffic Signals.—The Clydebank Electricity Committee is considering the installation of traffic signals in the Duntocker-Anniesland Boulevard.

Northants County Council is to install signals at the Towcester cross roads (£410), and signals are to be erected by Paddington Works Committee at a further five road junctions (£3,250).

Communications

Great Britain.—SIMULTANEOUS BROADCASTING.—In co-operation with the G.P.O., the B.B.C. has reorganised the system by means of which its studios and transmitters in different parts of the country are inter-linked by telephone lines for simultaneous broadcasting. New high-quality underground cable circuits have been made available for direct transmission between regional centres, thus shortening the lengths of circuits employed and avoiding transmission southward to London and thence northward again, as has been the practice hitherto.

RADIO RELAY SERVICES.—The Penrith Highways Committee has deferred applications for permission to establish relay services until information is obtained from other towns.

The Watford Electricity Committee is to be consulted regarding a scheme proposed to be operated within the borough.

The Edinburgh Streets and Buildings Committee is giving further consideration to a company's application in view of the possible revision of the Charter of the B.B.C. in 1936, since the B.B.C. is said to favour relaying on a national basis rather than by individual companies.

The Norwich Corporation favours the establishment of a service in the city in agreement with a company to be formed by local radio traders and represented by the St. Andrew's Wireless Depôt, Ltd.

The Runcorn Urban Council has refused an application by Mr. H. Birtwistle, of Rawtenstall, for permission to establish a service.

The Colchester City Council has refused a further application by F. W. Straw (Radio), Ltd., for permission to establish a service.

The Northampton Town Council has granted Messrs. Turner Bros., a local firm, a five-year concession to operate a service in the town, with the option of renewal at the end of that period.

The local Labour Party recently submitted a resolution to the Accrington Corporation protesting against the action of the Corporation in creating a private monopoly with regard to wireless relay services. The Corporation merely "received" the communication.

The Barrow-in-Furness Corporation Electricity Committee has asked its electrical engineer to report on an application from K.L.M. Radio Relays, Ltd., for permission to use certain of the electricity standards for relay services.

India.—SLOW TELEPHONE DEVELOPMENT.—According to a recent report, India, with a population of approximately 355,000,000, has only 57,000 telephones in use, or one to 6,500 of its people. Even for the 30,000,000 inhabitants presumably able to afford a telephone this gives only one instrument to 526 persons. Among the reasons for this backwardness, apart from the small earnings of the masses of the people, are the 220 separate and mutually unintelligible languages in India and the fact that only 10 per cent. of the population is urban.

Lithuania.—AUTOMATIC TELEPHONY.—The Government is expected to place a contract of the value of £170,000 with a British concern for the equipment of two automatic telephone exchanges at Kovno and Memel.

Lympne.—MICRO-RAY TELEPHONY.—The Air Ministry has established focused beam radio-telephone communication across the English Channel between Lympne Aerodrome, Kent, and St. Ingelvert, France. Two-way speech can be maintained on a wavelength between 17 and 19 cm., but the circuit is to be used for regular teleprinter service. The equipment has been made by Standard Telephones & Cables, Ltd., the input to the transmitter being 500 W only, and connection with land lines at both ends is entirely automatic.

Manchukuo.—TELEPHONE CONTROL.—The telegraph and telephone services in Manchuria, including those in the Kwantung Leased Territory, have just been placed under the consolidated control of the Manchuria Telegraph & Telephone Co., whose formation we announced on October 6th. It is understood that the radio services will also be brought under the management of this company.

Middlesex.—LOUD SPEAKER BYLAW.—Middlesex C.C. Parliamentary Committee reports that it has been suggested that the existing county bylaw relating to wireless loud speakers shall be extended so as to include the nuisance from dwelling-houses. When the Home Office was approached for its approval of the recent bylaw made by the County Council, it expressed the opinion that the bylaw should be restricted to nuisances arising from the operation of loud speakers in business premises only, and not include the nuisance from dwelling-houses. The promotion of the County Council's Bill this session will now afford an opportunity of overcoming the difficulty raised by the Home Office.

South Africa.—TELEPHONY.—There was a loss on the telephone department of the Post Office for the financial year 1932-33, due to restricted commercial activities and farming depression. A liberal policy as to payment of rentals has been followed for the past two years to enable farmers to retain their telephones, but discontinuances have occurred in large numbers. Between April 1st, 1930, and March 31st, 1932, the number of farm telephones given up was 2,779. A flat rate of £7 a year for services where the rental exceeded £7 was introduced on January 1st, 1932, and about 6,000 farmers benefited from the change. It is expected that this will arrest discontinuances and induce farmers to reconnect when their financial position improves.

AUTOMATIC EXCHANGES.—The six automatic exchanges in the Witwatersrand system which were established towards the end of the last financial year are operating satisfactorily, and the results confirm anticipations regarding improvements in the public service and economies resulting from the change-over. New automatic equipment is being installed at four more exchanges in that area which will be opened early in the New Year. The introduction of the "message rate" tariff, which provides for a uniform basic annual payment of £3 12s. plus 1½d. per call, has met with remarkable success.

SEPARATE P.O. AND RAILWAY SYSTEMS.—The commission which was appointed to inquire whether it was necessary to maintain and operate two separate telegraph and telephone systems by the Post Office and the Railways Administration has reported in the affirmative. On the recommendation of this commission an inter-departmental committee of technical officers has been appointed to put forward recommendations for the greatest measure of common use of the construction, maintenance, operating and supervisory staffs, as well as of the plant and apparatus, of both departments.

Sweden.—WIRELESS LICENCES.—The number of wireless licences issued is constantly growing, the increase for the third quarter of this year being 5,096. At the end of September licences were in force for 649,381 sets, which represents about 105 sets for every 1,000 inhabitants.—*Reuter's Trade Service* (Stockholm).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—BUENOS AIRES.—November 27th. State Oilfields. 600-V cable and house-wiring material. (A.Y. 12059.)*

Australia.—MELBOURNE.—Post and Telegraph Department. December 5th. Microphones. (A.Y. 12030.)*
December 19th. Telephone dial parts. (A.Y. 12031.)*
December 12th. Telephone parts and accessories. (A.Y. 12032.)* Telephone indicators. (A.Y. 12033.)*
November 28th. Lead-sheathed switchboard cables. (A.Y. 12002.)*
November 21st. Telephone terminal strips. (A.Y. 11996.)*
November 14th. Ringing dynamotors. (A.Y. 11984.)* Telephone ringers. (A.Y. 11986.)* Submarine telephone cable. (A.Y. 11973.)*
December 5th. Telephone switchboard cable. (A.Y. 12015.)*
December 12th. Multiple twin telephone cables. (A.Y. 12016.)*
December 19th. Vitreous resistances. (A.Y. 12042.)*
State Electricity Commission of Victoria. December 4th. 22,000-V switchgear and accessories, comprising oil circuit breaker equipments with current transformers. (A.Y. 12014.)*
January 8th. 115-kW a.c. motor. (A.Y. 12053.)*
January 15th. Triple braided copper conductor. (A.Y. 12054.)*

Belgium.—BRUSSELS.—November 15th. Post and Telegraph Authorities, Salle de la Madeleine. Supply of two lots of armoured telephone cable with accessories. Particulars (Cahier des Charges Special No. 3701) for 16 fr.

Bridgend.—November 10th. Electricity Department. Stores for six months, including cables, meters, time switches, cookers, washboilers, &c. (October 27th.)

Egypt.—CAIRO.—November 14th. Ministry of the Interior. Pumps, electric motors, boilers, &c. (G.Y. 12912.)*
November 30th. Six 50-kVA transformers. (A.Y. 12013.)*

Fife.—County Council. November 14th. Various works, including electric lighting and heating installation and additions and alterations at Kirkcaldy West School. Schedules (deposit £1 1s.) from Mr. G. Sandilands, County Master of Works, Property and Works Department, Education Offices, Wemyssfield, Kirkcaldy.

Grimsby.—November 10th. Electricity Department. L.p. cables. (October 27th.)

India.—NEW DELHI.—December 4th. Indian Stores Department. 220/230-V, single-phase, 50-cycle ceiling fans. (A.Y. 11959.)*
December 11th. D.c. ceiling fans. (A.Y. 11965.)*
January 8th. A.c. and d.c. table fans. (A.Y. 11967.)*
November 14th. Single-core flameproof v.i.r. insulated cable. (A.Y. 12010.)
November 23th. Cotton- and silk-covered wire. (A.Y. 12044.)*

London.—ISLINGTON.—November 17th. Electricity and Lighting Committee. Supply of materials and labour for laying distributor cables and earthenware pipes. (October 27th.)

Manchester.—November 10th. Electricity Committee. Substation switchgear during a period of twelve months. (See this issue.)

New Zealand.—WELLINGTON.—Posts and Telegraph Department. December 5th. 2,400 lb. of cored solder. (G.Y. 13046.)*
January 16th, 1934. Public Works Department. Four 1,500-kVA transformers. (A.Y. 12017.)*
January 8th. Microtelephone cradles. (A.Y. 12046.)* Telephone jacks. (A.Y. 12045.)*
January 9th. A 100-Ah secondary battery with 60 cells. (A.Y. 12047.)*

Northern Ireland.—BELFAST.—November 22nd. Police Committee. Electrically illuminated traffic signs. (See this issue.)

South Africa.—KROONSTAD.—December 4th. Municipal Council. Machinery and plant for a power station. (A.Y. 12004.)* Steam raising plant. (G.Y. 13038.)* Motors, meters, cable, transformers, conductors, kiosks and sundries. (A.Y. 12029.)*
CAPE TOWN.—November 29th. Electricity Department. Fifty automatic street-lighting controllers. (A.Y. 11994.)*
November 15th. L.p. ironclad switchgear. (A.Y. 12040.)*
November 18th. Electricity Supply Commission. One 1,500-kVA station oil-immersed transformer. (A.Y. 12041.)*
November 29th. 7,000 ironclad service cut-outs. (A.Y. 12051.)*
November 30th. H.p., l.p. and telephone cables. (A.Y. 12052.)*

Swansea.—December 4th. Corporation. Steam and feed water piping, valves, &c., for Tir John power station. (See this issue.)

Uruguay.—MONTEVIDEO.—November 30th. State Electricity Supply and Telephones Administration. 101,400 metres of lead-covered conductors. (A.Y. 12012.)
November 29th. 233,000 metres of insulated conductors for outdoor use. (A.Y. 12011.)*
November 9th. Ministry of Public Works. Machinery and accessories for pumping stations. (G.Y. 13074.)*

Wembley.—November 8th. Urban District Council. Carcase wiring, &c., of 150 cottages. (October 20th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bishop Auckland.—Durham County Assistance Committee. Recommended. Electric lighting installation at poor law institution (£630).—R. Robson.

Cheltenham.—Housing Committee. Accepted. Wiring houses on Whaddon Lane Estate (£559).—F. H. Bastin & Sons.

Dewsbury.—Electricity Committee. Accepted. 750-kVA static transformer (£276).—Yorkshire Transformer Co., Ltd.

Doncaster.—Town Council. Accepted. Electric lighting fittings for the Mansion House (£75).—Troughton & Young.

Glasgow.—Housing Committee. Accepted. Electrical installation in eighteen houses at Quarrybrae Street extension and twenty-eight houses at Carntyne (£159).—R. J. Sinclair (Glasgow), Ltd. Electrical installation in fifty-two houses at Hillhouse and Balgraybank and twelve houses at Summertown Road (£235).—F. McCready.

High Wycombe.—Town Council. Accepted. Installation of traffic signals (£429, plus £15 per annum for maintenance after the first twelve months).—Automatic Electric Co., Ltd.

Llandrindod Wells.—Urban District Council. Accepted. Convertor plant (£1,099).—Crompton Parkinson, Ltd.

London.—L.C.C. Central Public Health Committee. Accepted. Automatic telephone system at Park Hospital (£1,428).—L. G. Tate & Co., Ltd. Renewal of main cables at Northern Hospital, Winchmore Hill (£1,524).—G. E. Taylor & Co. Three electric stretcher lifts and one goods lift at Postgraduate Hospital and Medical School, Hammersmith (£2,830).—J. & E. Hall, Ltd. Wiring and fittings for electric lighting, power, &c., at Hammersmith Hospital (£5,196).—Pinching & Walton. Two electric bed lifts, Grove Park Hospital, Lee (£1,285).—John Bennie, Ltd.

Middlesex.—Hospital Committee. Accepted. Main switchboard, Shenley colony (£1,395).—Kartret Switchgear Co., Ltd.

Morecambe.—Electricity Committee. Accepted. Cables.—W. T. Glover & Co., Ltd.

Sleaford.—Electricity Committee. Accepted. Installations under assisted wiring scheme.—J. Lewis; C. H. Bratley & Sons.

Wallasey.—Electricity Committee. Recommended. Laying mains to Saughall Massie (£665).—British Insulated Cables.

Watford.—Electricity Committee. Accepted. House wiring for one year.—S. J. Cave; F. J. Hallett; Leonard J. Ive, Ltd.; J. W. Russell, Ltd. Two-panel cubicle-type switchboard (£162).—Metropolitan-Vickers Electrical Co., Ltd.

Forthcoming Events

Association of Mining Electrical Engineers.—(*South Wales Branch*).—Saturday, November 4th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Turbo Compressors." Mr. R. R. Huitson. (*London Branch*).—Tuesday, November 7th. Junior Institution of Engineers, London. 6.30 p.m. Presidential address by Mr. J. F. H. Colyer. (*Kent Sub-Branch*).—Saturday, November 4th. Dover Technical Institute. 6.30 p.m. "The Progress of Mining Electrification."

Institution of Civil Engineers.—Tuesday, November 7th. Institution, London. 6 p.m. Presidential address. Sir Henry P. Maybury.

Electrical Powers Engineers' Association (*London Technical Group*).—Tuesday, November 7th. Caxton Hall, Westminster, S.W. 7.15 p.m. "Sub-Station Switchgear." Mr. J. R. Mortlock.

Institution of Heating & Ventilating Engineers.—Wednesday, November 8th. Home Office Industrial Museum, London. 7 p.m. Discussion of Mr. A. H. Barker's paper on "The Relative Fuel Economy of Electricity, Gas, Oil and Solid Fuel as Heating Agents."

Association of Supervising Electrical Engineers & Institution of Engineers-in-Charge.—Thursday, November 9th. Magnet House, Kingsway, W.C. 7.15 p.m. "Domestic Electric Cooking Compared with Other Countries." Mr. A. G. Acworth.

Institution of Electrical Engineers.—Thursday, November 9th. Institution, London. 6 p.m. "The Low-Voltage Sections of the British 'Grid' System." Mr. C. W. Marshall. (*North Midland Students' Section*).—Saturday, November 4th. 2.30 p.m. Visit to the works of the Hunslet Engine Co., Ltd., Leeds. (*Mersey and North Wales* (*Liverpool*) *Centre*).—Monday, November 6th. University, Liverpool. 7 p.m. "The Travel of Wireless Waves." Sir Frank E. Smith. (*North Midland Centre*).—Tuesday, November 7th. Hotel Metropole, Leeds. 7 p.m. "An Analysis of the Costs of Electricity Supply and Distribution in Great Britain, &c." Mr. J. M. Kennedy and Miss D. M. Noakes. (*North-Western Centre*).—Tuesday, November 7th. Engineers' Club, Manchester. 7 p.m. "The Application of Automatic Voltage and Switch Control to Electrical Distribution Systems." Messrs. W. Kidd and J. L. Carr. (*South Midland Students' Section*).—Tuesday, November 7th. James Watt Memorial Institute, Birmingham. 7 p.m. "The Limiting Features of the Alternating Current System of Power Transmission." Mr. H. Rissik. (*Hampshire Sub-Centre*).—Wednesday, November 8th. University College, Southampton. 7.30 p.m. "Some Electrical Methods of Remote Indication." Messrs. C. Midworth and G. F. Tagg. (*Dundee Sub-Centre*).—Thursday, November 9th. University College, Dundee. 7.30 p.m. "Electricity Supply Costs and Tariffs." Mr. N. B. Macarthur. (*North-Eastern Students' Section*).—Friday, November 10th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. Address by Mr. F. H. Williams, senior chairman. (*London Students' Section*).—Tuesday, November 7th. 6.40 p.m. Visit to P.O. (London) Railway. Thursday, November 9th. Cock Tavern, Fleet Street, E.C. 7.15 for 7.30 p.m. Smoking concert.

Birmingham Electric Club.—Friday, November 10th. Grand Hotel, Birmingham. 7 p.m. "Some Problems of a Works Engineer." Mr. F. C. Platt.

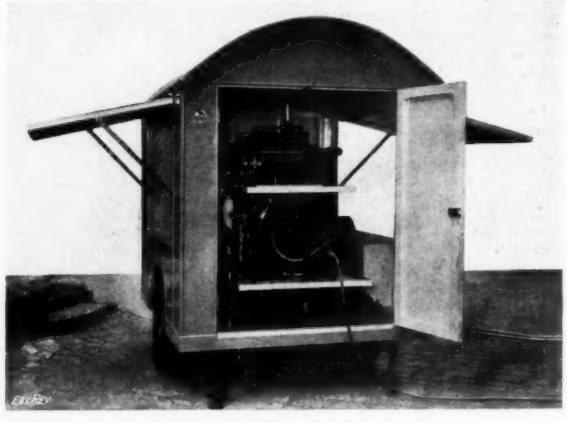
Junior Institution of Engineers.—Friday, November 10th. Institution, London. 7.30 p.m. Annual meeting.

Notes

Novel Oil-purification Plant

Oil-purification plant having certain interesting features has been put into operation in the North-East England grid area. The entire installation is mounted on a small trolley arranged so that it can be transported in a special trailer towed by a lorry. The accompanying illustration clearly shows the construction of the trailer with the small jacks for use when the lorry is not attached.

The unit is attached to the main oil plant by means of two 20-ft. lengths of ¾-in. diameter flexible metallic hose fitted with couplings. The oil is forced by means of a positive displacement pump through a 6-kW oil heater having a four-group



A travelling oil-purification plant

control, to reduce the viscosity, enabling purification to be more efficiently carried out. The centrifugal cleaner installed is of the De Laval type and a filter press having eleven chambers, each 9 in. square, is connected through piping in such a manner that the oil can be passed through both cleaners or through either separately. Filter paper for use in these presses must be perfectly dry, and to accomplish this a small drying oven is incorporated. A 1-kW unit with three-heat control provides ample heating capacity.

Delivery of the purified oil from the centrifuge is to a de-aerating tank, from which source the delivery pump draws for pumping back into the main system. The power requirements of the plant are supplied by a 2-h.p. 400-V three-phase motor, which is controlled by an air-break starter. Connection to the power supply is by means of a 30-ft. length of 15-A c.t.s. trailing cable fitted with a Reyrolle plug and socket.

Warning!

Members of the Institution of Electrical Engineers are warned that a person, who falsely describes himself as "A.M.I.E.E." on his cards, has called on a number of members, stating that he has obtained a position in the provinces and asking for money for his fare to enable him to take up his work.

An Advance in Sound Reproduction

At a private theatre in London recently an improved method of recording and reproducing sound for "talkies" was demonstrated. This "Wide Range" system is the outcome of research by the Western Electric Co., and improves the quality of speech. Whispers are heard with naturalness and full dramatic effect, free from extraneous noise, while loud sounds are produced without distortion, and in a swimming pool scene the sounds of splashing water could be heard. This new system allows a wider band of sound waves to be transmitted, actually amounting to two octaves, although the energy passing through the amplifiers is the same. An important factor is that it can be applied to the existing apparatus in cinemas; certain refinements can be effected and a few extra parts can be easily and quickly installed.

"Neonise to Advertise"

This is the slogan on which Mr. Mervyn Henry, publicity manager of the Franco-British Electrical Co., Ltd., based an address to the Cambridge Publicity Club on October 17th. Following a brief outline of the technicalities of neon tube manufacture, sign construction, and erection, the lecturer expressed the opinion that neon advertising was not a fad. Its intensity, variety of colours, low running cost, and manifold applications offered many possibilities for the future. That it would entirely supersede all other types of illuminated signs was questionable. A more reasonable assumption was that neon, electric lamps, and floodlighting would be used in conjunction. At the moment, electric lamps held many advantages over neon for animated and temporary displays, and where initial cost was the prime factor. There were practically no limits to neon tube bending. The most intricate and artistic designs could be faithfully reproduced. Existing lamp signs and shop facias could be adapted readily, and the day appearance of a neon sign was far superior to that of a lamp-studded sign. For exterior decoration the ideal to be aimed at was the closest possible collaboration between the architect and the sign manufacturer. Neon tubing at its best should form an integral part of a building and not be just hung on as an afterthought.

Electricity and the Architect

There is every indication that the architectural profession is taking more and more interest in the practical problems accompanying the application of electricity, quite apart from the obvious example of the Building Centre in Bond Street, W. That this interest should be maintained is of fundamental importance to the electrical industry. In laying out a new factory, stores, or housing scheme it is essential to the ensuring of satisfactory results that the electrical engineer should act from the outset in close collaboration with the architect. For example, ample provision for conduit runs should be made in the builders' drawings for lighting, power, telephone, clock and bell mains.

Further evidence is afforded of appreciation by architects of the need for this co-operation in the November *Architectural Review* (2s. 6d.), which is an excellently produced and well illustrated special number devoted to electricity. Apart from a supplement prepared by the Electrical Development Association which deals for the most part with space heating, tenement electrification, and domestic uses, there are fourteen articles on different aspects of electricity, including national transmission and regional power supply on the heavier side of engineering down to detailed notes on electricity in architectural practice, the kitchen, and heating and lighting.

The position of electricity in seven countries is compared in "The Economic Background" (H. Quigley), and a forecast is made of the ultimate position. In others regional town planning is considered in relation to the distribution of electricity: new housing schemes and slum clearance, which present so big an opportunity to the electrical engineer, are dealt with in a manner that should provide a useful source of ideas.

Electrical Engineers' Ball

The next Electrical Engineers' Ball will be held at Grosvenor House, Park Lane, W., on Friday, February 9th, 1934, the day after the annual dinner of the Institution of Electrical Engineers. Any surplus that may be available after defraying the cost of the function will be handed over to the I.E.E. Benevolent Fund, under whose auspices the function is managed. The general committee for the 1934 ball will include those who served on the former general committee, and the detailed arrangements will be in the hands of an executive committee. We are informed that the function will be on the same lines as those of the previous balls which have always been so well attended, and the arrangements for the distribution of tickets will be published later.

A French e.h.p. Testing Plant

In view of the increasing number of high-voltage electric power transmission lines in those parts of the country subject to severe storms, a good deal of attention is at present being paid in France to the effect of lighting on such lines, and particularly on the insulators used with them. The illustration on page 625 depicts the special department recently set up at the works of the Société des Ateliers de Constructions Electriques de Delle at Villeurbanne, Lyons, for the carrying out of tests of insulators under the action of artificially produced lightning discharges at 500,000 V.

The installation, which is arranged in accordance with what is known as the Marx plan, comprises four cylindrical blocks of condensers resting on insulating columns of different lengths, the condenser units being separated one from the other by arcing spheres. Each condenser receives its electrical charge from a rectifier which is connected up to the secondary of a 220-125,000-V transformer. The method of operation of the plant is as follows: as the condensers become charged the pressure at the terminals gradually increases to a point when it is almost possible for a spark to jump across the gap at the spheres. At that particular moment the condensers become automatically and instantaneously connected in series, causing them to be suddenly discharged at a combined pressure of 500,000 V, the discharge passing through either the lightning conductor or the insulator under test. By means of suitable connections any desired intensity of discharge between 3,500 and 5,500 A can be obtained.

I.E.E. Dinner at Liverpool

The annual dinner of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers will be held on November 29th at the Adelphi Hotel, Liverpool, at 7 for 7.30 p.m.

Appointments Vacant

Showroom sales superintendent for Bury Electricity Department.

District consumers' engineer for the West Gloucestershire Power Co., Ltd.

(See our classified advertisements.)

Makers' Names Wanted

OAKLITE fittings.
LAZIBOY gramophone attachment.
Agent for VICTOR dimming-light switch.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Viscount Elibank has been elected chairman of the Southern Areas Electric Corporation, Ltd., in succession to Mr. A. C. Whitmee, who has resigned the chairmanship and has also retired from the board.

The Court of Appeal in Athens has rejected the demand of the United States authorities for the extradition of **Mr. Samuel Insull.** The Athens correspondent of *The Times* reports that the refusal was on the grounds that Mr. Insull was not guilty of fraudulent intent, since the charges in the American indictment failed to prove fraudulent bankruptcy, and that his offence was not punishable under Greek law.

Mr. G. A. Proctor, who, as reported in our last issue, has been appointed sales manager to the Manchester Corporation Electricity Department, has spent his entire career with that Department, commencing in 1896 at the Dickinson Street works office. He studied at the Manchester Technical School, now the College of Technology. For many years he was senior sales assistant, and since 1924 he has been assistant sales manager.

Mr. G. A. Proctor

Before **Mr. P. V. Hunter** delivered his presidential address at the opening meeting of the session of the Institution of Electrical Engineers in London on October 26th, the retiring president, **Professor E. W. Marchant,** made a presentation to **Mr. R. H. Tree,** chief clerk to the Institution, who is retiring after fifty-three years' service. Prof. Marchant said that it had been the desire to make a presentation to Mr. Tree to commemorate his services to the Institution and a Committee had been formed of which Mr. James Swinburne was hon. secretary and Sir Arthur Preece was hon. treasurer. Prior to joining the Institution staff, the president added, Mr. Tree was with the firm of Sir Francis Bolton, one of the two co-founders of the Institution. The presentation took the form of a suitably-inscribed silver salver, silver teapot, cream jug and sugar bowl and a cheque, and in handing these to Mr. Tree the president wished him a happy time in his retirement. Mr. Tree, in a short speech, expressed his appreciation of the presentation and of the kindness and courtesy he had received at the hands of the Council and all the members of the Institution during the many years he had been on the staff. He had had, he said, a happy time during that period and looked forward to being allowed to attend the Institution meetings and sign the visitors' book in the future.

Mr. David Bennett, A.M.I.E.E., who is the president of the Electrical Contractors' Association of Scotland for the year 1933-34, was educated at Woodside and Allen Glen's Schools, and the Royal Technical College, Glasgow. In 1902 he commenced his training with Messrs. Haddow & Co., Ltd., and subsequently gained experience in the Belgian Congo as an electrical engineer for a subsidiary company of Messrs. Lever Bros., Ltd. During the war he was engaged in supervising electrical installations for the Navy. He rejoined Messrs. Haddow & Co. as a director in 1919, and since then has taken a prominent part in large installation work, both at home and abroad, carried out by that company on land and in ships. Mr. Bennett was elected to the Committee of the Glasgow Branch of the Scottish E.C.A. in 1922, was vice-chairman of the branch in 1929, and chairman in 1930. For the past year he has been vice-president of the Association. He is a prominent Mason and a keen sportsman, his principal recreations now being golf and bowling.

Mr. David Bennett

Mr. K. P. Wood has joined the firm of Messrs. Jas. Beresford & Sons, Ltd., of Birmingham, as sales manager. He is an M.A. of Cambridge University, and received his practical engineering training with the Metropolitan-Vickers Electrical Co., Ltd., Manchester, and Messrs. Belliss & Morcom, Ltd., Birmingham.

Mr. Wood is the second son of Mr. A. P. Wood, founder and formerly managing director of the Lancashire Dynamo & Motor Co., Ltd., and now a director of Messrs. Laurence, Scott & Electromotors, Ltd.

Mr. K. P. Wood, M.A.

News Chronicle, Manchester

Alderman W. Walker, Lord Mayor of Manchester, receiving the "Ferranti" radiogram presented to him by the N.J.B.and N.J.I.C. for the Electricity Supply Industry, of which bodies he is chairman

Mr. C. Herbert Smith has accepted a seat on the board of Messrs. W. and T. Avery, Ltd., of Birmingham.

Mr. A. G. Douglass has been appointed by Erith Urban District Council as assistant mains engineer, **Mr. B. Godwin** as mains assistant, and **Mr. S. Burman** as assistant distribution engineer.

Mr. H. Bailey has joined the outdoor staff of Lighting Trades Ltd., and the Welsbach Light Co., Ltd., as their representative for the Midland Counties.

Mr. H. W. Biskeborn has completed arrangements with the Hackbridge Cable Co., Ltd., and the Yorkshire Electric Transformer Co., Ltd., to represent their interests in London and the Home Counties. His address is Magna Works, Alsen Road, N.7.

Mr. F. W. Le Tall and **Mr. A. S. Cachemaille,** chartered patent agents, have discontinued the use of Westinghouse Patent Bureau as the name of their firm, but are continuing to carry on the partnership under their own names at 2, Norfolk Street, Strand, W.C.

Mr. K. Headlam-Morley has been appointed secretary of the Iron and Steel Institute in succession to **Mr. G. C. Lloyd,** who has resigned. Mr. Lloyd has accepted the position of hon. secretary, and is maintaining his close association with the Institute in an advisory capacity.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Ruths Arca Accumulators, Ltd.—Private company. Registered October 27th. Capital, £12,500 in 5s. shares. Objects: To acquire from Ruths International Accumulators, Ltd., the portion of its goodwill relating to the supply of accumulators in the British Empire (except Canada) and certain of its assets in connection therewith, and to carry on the business of manufacturers, buyers and sellers of steam accumulators, and devices of all kinds for improving the efficiency of steam plants, mechanical, electrical and general engineers, &c. The subscribers are: Geo. J. Withington, The Gables, Francis Road. Stechford, Birmingham; Henry C. Chambers, Kerri, Blakeley Road, Yardley, Birmingham. The first directors are Reginald K. Morcom, Herbert T. Denton, Sven L. Bengtson, Richard Friedmann, and Joseph M. Kenworthy. Solicitors: Pinsent & Co., Birmingham.

Northern Wireless Relay Co., Ltd.—Private company. Registered October 23rd. Capital, £20,000 in 10,000 preference and 10,000 ordinary shares of £1 each. Objects: To acquire the undertaking and assets of Northern Wireless Relay Co., Ltd. (incorporated in 1931) and to establish, maintain and develop a service for the relaying of wireless radio and television entertainment programmes and news to subscribers and others. The directors are: H. B. Grotrian, Knowles, Leighton Buzzard; S. R. Macdonald, "Elstan," Orchards Way, Esher, Surrey; G. C. Robinson, 26, North Avenue, Gosforth, Northumberland; and W. W. Wakefield, 6, St. James' Terrace, Regent's Park, N.W. Secretary: S. R. Macdonald. Registered office: Bush House, Aldwych, W.C.2.

A. O. Gibbons, Ltd.—Private company. Registered October 26th. Capital, £2,900 in £1 share (1,400 7 per cent. non-cumulative preference and 1,500 ordinary). Objects: To acquire the business of an illumination engineer, carried on by Arnold O. Gibbons at 16, Carlisle Street, Dean Street, Westminster. The directors are: Arnold O. Gibbons, 100, Norroy Road, Putney, S.W.15; J. A. Blenkin, 65, Pinner Park Avenue, Harrow, Middlesex; Norah Korel, 125, Kenilworth Court, Putney, S.W.15, and E. W. Harris, 70, Hurst Road, Sidcup, Kent. Secretary: S. C. Houston. Registered office: 16, Carlisle Street, Oxford Street, W.1.

John Paton, Ltd.—Private company. Registered in Edinburgh October 25th. Capital, £500 in £1 shares. Objects: To carry on the business of wireless engineers, manufacturers, dealers, and agents for wireless receiving sets, &c. The directors are: John Paton and Mrs. A. M. Paton, both of 6, Gardener Street, Prestwick. Registered office: 1, Boyd Street, Prestwick.

Deflectors, Ltd.—Private company. Registered October 27th. Capital, £1,250 in 1,000 preference shares of £1 and 500 ordinary shares of 10s. each. Objects: To carry on the business of engineers and manufacturers of and dealers in electrical apparatus, manufacturers of deflectors, light shades, electrical signs, &c. The permanent directors are: H. Cornish, Rixdale, Reservoir Road, North Prenton, Birkenhead; and G. Manbre, 18, Hartington Road, Liverpool, 8. Secretary H. A. Patterson, 18, Hackins Hey, Liverpool.

Oates Electrical Components, Ltd.—Private company. Registered October 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business of an electrical component manufacturer, heretofore carried on by Horace Oates, at Fieldgate, Walsall. The directors are: H. Oates, 53, Dora Street, Walsall; and G. E. Rowley, 28, Princess Street, Chase Terrace, near Walsall.

Universal Contacts, Ltd.—Private company. Registered October 28th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electricians and contractors, electrical, mechanical, motor, telephone, heating, ventilating, and general engineers, &c. The directors are: R. D. Law, "Woodville," Purbeck Avenue, Prestatyn, North Wales; and C. S. G. Davis, 23, School Grove, Withington, Manchester. Secretary: R. D. Law. Registered office: 19, Milton Street, Lower Broughton, Salford.

South Beds. Electrical Finance, Ltd.—Private company. Registered October 23rd. Capital, £3,000 in £1 shares. Objects: To finance the acquisition and installation in dwelling-houses, shops, and other buildings of electrical energy, electrical fittings, and all kinds of electrical appliances and apparatus, &c. The directors are: R. M. Plummer, 12, Guildford Street, Luton; A. F. Plummer, 1, Langley Street, Luton; and Arthur T. Snowden, 24, Mill Street, Luton. Registered office: 11, George Street West, Luton.

Windles (Nelson), Ltd.—Private company. Registered October 23rd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers and repairers of, agents for and dealers in electrical accumulators, batteries, dynamos, motors, transformers, magnetos and electrical plant, wireless transmitting and receiving sets, &c. The directors are: B. Windle, 51, Ridgeway Avenue, East Barnet; and W. Roberts, Craigmore, Blacke, Nelson. Registered office: 1a, Pendle Street, Nelson.

Ridgelite Electric Co., Ltd.—Private company. Registered October 23rd. Capital, £500 in £1 shares. Objects: To carry on the business of dealers in and manufacturers of electric incandescent lamps and electrical goods, &c. The first director is S. Kaplan, 85, The Ridgeway, Golders Green, N.W.11. Registered office: 29a, Charing Cross Road, W.C.2.

Radio & Accessories (1933), Ltd.—Private company. Registered October 25th. Capital, £500 in £1 shares. Objects: To carry on the business of dealers in all kinds of electrical, radio and telephone appliances, gramophones, &c. The directors are: Marie Swetliz (permanent governing director and chairman), 499, Green Lanes, Harringay, N.4; Alice Apple, 36, Corringham Road, Golders Green, N.W.11, and others to be appointed by the latter. Registered office: 499, Green Lanes, Harringay, N.4.

Salmon Accessories, Ltd.—Private company. Registered October 26th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in domestic and other hardware, motor and electrical accessories, &c. The directors are: Nancie N. Salmon and Mary M. Salmon, both of 38, Addiscombe Road, Croydon. Registered office: Duppas Works, 32, Duppas Hill Lane, Croydon.

Electric Light Wood Fittings Co., Ltd.—Private company. Registered October 24th. Capital, £5,000 in £1 shares. Objects: To acquire the business of a dealer in wood electrical fittings formerly carried on by the late Lt.-Col. H. C. Stevens at 10, Sedley Place, Woodstock Street, London, as the "Wood Electric Fittings Co.," and to adopt an agreement with Alice M. Stevens and R. M. Bruce. The subscribers are: Charles F. Butler, 23, Frances Avenue, Bexley Heath; and George Parnell, 67, Fenwick Road, Peckham, S.E. Solicitors: Neve, Beck and Crane, 21, Lime Street, E.C.3.

Returns of Electrical Companies

A. & E. Durn & Co., Ltd.—P. H. Wingham, 35, Hornchurch Road, Romford, ceased to act as receiver and manager on September 30th, 1933.

Thomasson & Co. (Shrewsbury), Ltd.—Satisfaction to the extent of £1,500 on October 12th, 1933, of debenture dated June 21st, 1933, and registered July 10, 1933. (According to the register of mortgages, the debenture registered July 10th, 1933, originally secured £2,500.)

Standard Radio Relay Services, Ltd.—The nominal capital has been increased by the addition of £10.000 beyond the registered capital of £60,000. The additional capital is divided into 200,000 ordinary shares of 1s.

North Eastern Electric Supply Co., Ltd.—Capital, £8,760,000 in 1,500,000 7 per cent. cum. preference, 2,500,000 5 per cent. preference and 4,760.000 ordinary shares of £1. Return dated April 4th, 1933. 1,500.000 7 per cent. preference, 1,609,640 5 per cent. preference, and 4.759,919 ordinary shares taken up. £6,806,667 paid on 1,500.000 7 per cent. preference, 741,055 5 per cent. preference, and 4,565,645 ordinary. Calls unpaid: £33. £1,062.859 considered as paid on 868,585 5 per cent. preference and 194,274 ordinary shares. Mortgages and charges: £4,814,150.

Paignton Electric Light & Power Co., Ltd.—Capital, £90,000 in £1 shares. Return dated April 25th, 1933. 80,000 shares taken up. £60,000 paid, £20,000 considered as paid. Mortgages and charges, nil.

Ericsson Telephones, Ltd.—Capital, £500,000 in 199,970 preference and 300.030 ordinary shares of £1. Return dated April 19th, 1933. All shares taken up. £269,980 paid (£1 per share on 50,010 ordinary and 199.970 preference, and 8s. per share on 50,000 ordinary). £230.020 considered as paid (£1 per share on 200,020 ordinary and 12s. per share on 50,000 ordinary). Mortgages and charges: £50,000.

Wandsworth Electrical Manufacturing Co., Ltd.—Capital, £25,000 in £1 shares.—Return dated March 28th, 1933. 17,230 shares taken up. £14,365 paid, £2,865 considered as paid. Mortgages and charges, nil.

D.P. Battery Co., Ltd.—Capital, £100,000 in £1 shares. Return dated March 24th, 1933. All shares taken up. £28,000 paid. £72,000 considered as paid. Mortgages and charges, nil.

Hill & Co. (Radio), Ltd.—Satisfaction to the extent of £100 on July 31st, 1933, of debentures authorised June 23rd, 1932, and registered June 29th, 1932, securing £1,000.

Peterhead Electricity Co., Ltd.—Capital, £5,000 in £1 shares. Return dated May 29th, 1933. All shares taken up. £5,000 paid. Mortgages and charges, nil.

J. Stone & Co., Ltd.—Capital, £1,200,400 in 600,000 preference and 600,400 ordinary shares of £1. Return dated June 13th, 1933. All shares taken up. £1,200,400 considered as paid. Mortgages and charges, nil.

White & Mantle, Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1932 (filed May 5th, 1933). 551 shares taken up. £301 paid, £250 considered as paid. Mortgages and charge, nil.

Beaver Radio (Manchester), Ltd.—Mortgage debenture, dated September 26th, 1933, to secure £1,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. R. Beaver, 27, Grove Park, Liverpool.

Syd Davis (West Bromwich), Ltd.—Particulars filed of £1,000 debentures authorised September 22nd, 1933, charged on the company's undertaking and assets, including uncalled capital, the whole amount being now issued.

General Gas & Electricity Co., Ltd.—Debenture dated October 12th, 1933, to secure £20,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd.

Viking Sales, Ltd.—Three notices of the appointment of H. S. Wilson, 41, Spring Gardens, Manchester, as receiver on October 20th, 1933, under powers contained in debentures registered May 17th, 1932, and January 3rd and June 6th, 1933.

S. P. Catterson & Sons, Ltd.—Particulars filed of "A" debentures not exceeding £4,000 authorised October 3rd, 1933, charged on the company's undertaking and property, present and future, including uncalled capital (subject as to freehold and leasehold lands, works, hereditaments and premises to charge dated August 31st, 1893), the amount of the present issue being £4.000.

City Notes

The Perak River Hydro-Electric Power Co., Ltd., held its annual meeting on October 31st. Mr. G. Balfour (chairman), who presided, in the course of his speech, said that their subsidiary, the Kinta Electrical Distribution Co., Ltd., was progressing, but it would take time before any great results could be expected. The hydro-electric plant at the Chenderoh power station had given excellent service, and had operated with complete satisfaction throughout the year and provided the whole of the supply to consumers. During the year they acquired the generating station of the Malayan Tin Dredging Co., which supplied the mines of that company, and of the Southern Malayan Tin Dredging Co., and they first supplied power to these companies towards the end of May. Last year he had to give the shareholders a gloomy forecast, but this year he was able to take a more cheerful outlook. Efforts were made to give greater stability to the demand from consumers, and to increase their range of consumers. The result of these efforts had been that they started this financial year with a very different outlook and with a growth of good feeling all round. For the first three months of the current year, the net revenue would not fall short of the net revenue for the first six months of the previous year. These results were being achieved without any increase in output under the tin restriction scheme which, it had now been announced, would take place in January, and which should materially increase their output. He saw no reason, therefore, why they should not make, as a conservative forecast, an increase in the amount carried to the net revenue account amounting to at least double the figure for last year.

Joseph Lucas, Ltd.—Presiding at the annual meeting on October 31st, Ald. H. J. Sayer (chairman), said that as regarded the motor industry, the past year had been a remarkable one. November was actually a record so far as they were concerned, and they had a full demand right up to the end of the season. The increasing demand for small cars meant that much larger quantities had to be produced if the turnover in value was to be maintained. They were endeavouring to meet this by increasing the range of their products. Year by year also they had been able to reduce their prices and increase their service to the motor manufacturers. Their subsidiary, C.A.V.-Bosch, Ltd., had been affected by the uncertainty which for some years had surrounded the heavy commercial vehicle side of the industry, but there were signs that there would be a revival on that side also. The company had earned a reasonable profit. At the conclusion of the general meeting resolutions were passed authorising the distribution of bonus shares, an increase in capital, and the formation of the Lucas Workers' Share Bank.

The Bagdad Light & Power Co., Ltd., held its annual meeting on October 26th, Mr. J. G. B. Stone (chairman) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, October 27th, page 611), the chairman said that the accounts presented covered the year up to which the old and uneconomical plant was still in operation. Under these conditions the profit of £8,601 was satisfactory. As regarded the construction of the new plant, the power house was put into commission in April last and the two new sub-stations at Abakhama and North Gate had been installed for supplying the centre of the town by d.c., the suburbs and motive power being supplied by a.c. The number of consumers connected at December 31st last was 6,625, as compared with 5,185 in 1931, the maximum demand being 1,126 kW, as compared with 952 kW. Regarding the present position, the figures received showed a further substantial improvement in profits. Since the date of the balance sheet now presented the 100,000 8 per cent. cumulative preference shares of £1 each were changed in May, 1933, into 7 per cent. cumulative convertible preference shares of £1 each, and in June last a further 150,000 of the unissued shares were issued for cash as 7 per cent. cumulative convertible preference shares. The present issued and fully-paid capital was therefore 200,000 ordinary shares of £1 each and 250,000 7 per cent. cumulative convertible preference shares of £1 each. The report and accounts were adopted and the election of Mr. S. H. Taylor to the board was approved.

Electrical & Musical Industries, Ltd., which embraces the Gramophone Co. and the Columbia Graphophone Co., reports a net profit of £902 for the year ended September 30th last. The aggregate loss of the subsidiaries was £374,482, which has been provided for in their accounts out of reserves and surpluses. This loss compares with a loss of £741,084 in the preceding year. The parent company received as contributions from subsidiaries for management and other income £82,648, as against £115,063 for the initial seventeen months. The preference dividend is in arrears from July, 1932, and the directors are unable to recommend any dividend in respect of the year covered by the accounts. The net profit, with £2,314 brought in, is carried forward. The directors state that the sales of the subsidiary companies in the British Empire increased during the last two months of the financial year, and that this increase is being maintained. There has, however, been a further diminuation in the foreign sales, and this has been particularly severe in Germany. Economies effected in the organisations have substantially reduced trading losses abroad. Meeting: November 17th.

Meters, Ltd., has declared an interim ordinary dividend of 2½ per cent. (same).

The North Eastern Electric Supply Co., Ltd.—On Tuesday last Messrs. Lazard Bros. & Co., Ltd., offered for sale £2,500,000 3½ per cent. consolidated debenture stock of the North-Eastern Electric Supply Co., Ltd., at 96 per cent. The purpose of the issue is to provide (with a small margin) the sum required by the company to redeem the £2,110,903 outstanding of its 4½ per cent. consolidated first mortgage debenture stock which has been called for repayment at 105 per cent. on April 28th, 1934. Holders of the old stock may exchange into the new and acceptors will receive a cash payment of £9 13s. 6d. per cent. to cover redemption premium, discount on the new stock and adjustment of interest. The new stock will rank *pari passu* with the outstanding 5 per cent. debenture stock, and will be redeemable at par by July 1st, 1964, a sinking fund commencing to operate in respect of the year ending July 1st, 1936. The company may repay the issue in whole or part on or after July 1st, 1954. The issue was oversubscribed shortly after the opening of the list.

Erinoid, Ltd., held its annual meeting on October 26th, when Mr. A. Binnie (chairman), who presided, in the course of his speech, said that last year they were able to report a record amount of sales This year they had a further substantial increase, but with a slightly lower margin of profit. Up to date, since July 31st, the sales had increased a great deal in comparison with the same period in 1932. They had commenced the manufacture of "Erinofort," a new material of non-inflammable celluloid, which they were confident would develop successfully.

The Manaos Tramways & Light Co. reports receipts for the year ended April 30th last of Rs.2,796 : 753. The net profit in sterling, including profit on the sale of investments, was £6,590, as compared with £3,442 in the proceding year. After deducting a debit of £3,448 brought in, and making provision for loss on exchange (£1,483), there is a balance of £1,659, which has been transferred to renewals reserve.

The International Power Co., which controls light and power corporations in Newfoundland, Porto Rico and South America, reports net earnings for 1932 of $1,997,500, as compared with $2,330,000. After meeting interest, exchange and dividends to subsidiaries, the net amount available for dividends is $891,000, against $1,214,000

Callender's Share & Investment Trust, Ltd., reports a net profit for the year ended August 31st last of £35,819, as compared with £35,235 in the preceding year. Reserve receives £500 and the dividend is maintained at 20 per cent., leaving £10,509, which with the balance brought in makes £74,735 to be carried forward.

Companies to be Struck Off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary: Community Radio, Ltd.; Correcta Light, Ltd.; Electrico, Ltd.; Short Wave Communications Development Co., Ltd.; Singapore Electric Tramways, Ltd.

The Shropshire, Worcestershire & Staffordshire Electric Power Co. is paying an interim dividend of 4 per cent. on the "A" ordinary shares and 2½ per cent. on the "B" ordinary shares. No interim was paid on the "B" shares last year, but the final distribution was 5 per cent. The "A" ordinary interim is at the same rate as last year.

Stothert & Pitt, Ltd., reports a loss for the year ended June 30th last of £24,665, as compared with £16,629 in the preceding year. After crediting £68 brought in and transferring £24,600 from reserve, there is a balance of £3 to be carried forward.

The Shanghai Electric Construction Co., Ltd., has announced an interim dividend of 4 per cent., tax free (same).

W. T. Henley's Telegraph Works Co., Ltd., has declared an interim ordinary dividend of 1s. 6d. per share, less tax.

Glenfield & Kennedy, Ltd., has announced an interim dividend of 2 per cent. on the ordinary shares (same).

Stocks and Shares

TUESDAY EVENING.

ISSUE after issue is making its appeal to a public whose appetite for gilt-edged stock appears to be insatiable. The success that attends the majority of these offers is no more than a practical reiteration of the somewhat monotonous statement in regard to the super-abundance of capital for which employment is sought in Stock Exchange securities. Borrowers have no difficulty in obtaining terms which two or three years ago would have been regarded as extremely improbable, if not actually fantastic. A South African Colony appealed at the end of last week for 2½ million pounds, and received applications for 90 millions. Ease in the Money Market continues to be an outstanding factor, and it is obvious that one effect of President Roosevelt's policy is to be seen in the driving of money into this country for investment on behalf of capitalists who feel that in no other land is there the security and stability which Great Britain affords at the present time. The same observation is equally applicable to investors in France, Germany and other parts of the Continent. Whoever has money to spend appears to be sending it to London, with the result that gilt-edged stocks advance almost day by day.

North Eastern Electric Success

The North Eastern Electric Supply Company has been making an issue of 2½ million pounds in 3½ per cent. debenture stock, at the price of 96. Holders of the company's 4½ per cent. consolidated first mortgage debenture stock, due for repayment at 105 on April 28th next, are given a right to exchange their holdings into the new stock. It may be surmised that the greater number of these holders will elect to change over into the new security. The subscription lists were open for just five minutes, when the amount offered was more than covered.

London Transport Stocks

Central Electricity 5 per cent. stock of 1950-1970 has advanced to 114. London Passenger Transport "A" and "B" shares are both higher. The last named authority's "C" stock has, however, gone back 4 points to 82. The stock carries, of course, speculative risk, in that nobody can tell what dividend is likely to be paid. The estimates continue to vary from 3½ per cent. to 5 per cent., caution leaning to the lower side. Some of those who have studied the subject most closely are of the opinion that the stock will receive 5 per cent. whether or not this rate is shown to be earned. The problem cannot be resolved until declaration of the dividend next summer, so there is plenty of time for the

exercise of the speculator's imagination. Some of the leading banks and insurance companies have bought lines of the stock, as a permanent investment.

The gilt-edged stocks in the Home Railway section fully maintain their previous prices. It may be said that if any of the companies were to make new issues at this juncture the stock would be gladly taken, provided it were offered at a reasonable figure and had sound security to recommend it.

Home Electricity Shares

County of London Electric, which fell ⅛ last week, have shed a few more pence, and the price is now 56s. 3d. To explain the shrinkage, it is said that a fairly large deceased account in the shares is being realised. The rest of the London shares hold their prices very well, and in the Provincial group the only change recorded in our lists is a reaction to 46s. 3d. in Yorkshire Electrics. Southern Areas gave way to 24s. West Gloucestershire ordinary rose 10s. to 69. Atlas Light & Power recovered from 9s. 3d. to 10s., but reverted to 9s. 6d. British Light & Power at 19s. 6d. have lost 6d. North Metropolitans at 60s. 6d. regained the dividend deduction.

The Grid

The Central Electricity Board has announced that a new grid tariff will come into operation in South East England and East England on New Year's Day next. The full notice will be found elsewhere in this issue. London is to be included in the area to which the new tariff will apply: an area, that is to say, of nearly 13,000 square miles, with a population of 13½ million people.

Cables and Wireless

Cables and Wireless 5½ per cent. preference is down a point, and the two ordinary stocks are 10s. lower. These movements have aroused some little disappointment in the face of the index number for September given here last week. This number, 67.9 per cent., registered an advance after four months of declining proportion, but the improvement failed to bring in buyers of the stocks. Probably there is still something of a stale bull account, and, until this becomes cleared out of the way, the market will remain dull. Great Northern Telegraphs at 32½ are the fraction higher. Of the telephone shares, Orientals hardened to 58s. 9d. Anglo-American Telegraph issues have gone ahead. Jutland Telephone bonds remain in demand on the basis of 105, but there is practically no stock on offer. American Telephone & Telegraph fell 8 points to 119½, while Internationals at 12½ have at length shown a disposition to rally from their protracted heaviness.

Dollar Stocks

President Roosevelt succeeds in mystifying more and more with each day that passes those who are endeavouring intelligently to follow his policy, or, in other words, to understand what he is driving at. The one clear fact which emerges from the general obscurity in regard to his actions is that he wants to raise prices. In pursuance of his plan, the President has now announced his intention of buying gold, this causing further perplexity, seeing that it would have the effect of putting up the price of gold, which, in its turn, should automatically lower the prices of commodities and the baser metals. In the uncertainty thus produced, prices have tended to give way amongst American and Canadian electrical issues. Shawinigan Water shares have gone back to 17, and Power Corporation of Canada to 7½. Montreal Light, Heat & Power shares at 35½ are a point down. Consolidated Gas & Electric of Baltimore at 60 have also given way. The attention paid to these issues on this side of the Atlantic is only limited, but there are still a good many people to whom these quotations are of interest.

Manufacturing and Equipment

Brush Electrical ordinary stock has risen 3 points to 40. Electric Constructions are a little better at 10s. Johnson & Phillips went back to £1. A good deal of business in Enfield Rolling Mills shares took the price to 30s. 3d. before it eased off to 29s. 6d. Ericsson Telephones have also been an active market, with a rise at one time to 53s. 9d. Enfield Cables reflect, with a rise to 4¾, the strength shown by Enfield Rolling Mills. Siemens are harder at 24s. 6d. and persistent demand for Telegraph Constructions led to the price gaining 2s. 6d., at 26s. 3d.

Miscellaneous Matters

Anglo-Argentine Trams first preference have dropped to 3s. 3d.: business in the shares was recorded this week at the drapery price of 1s. 11¼d. The second preference changed hands at 1s. 5¼d. Victoria Falls ordinary shares regained ¼ of their recent sharp decline. Electric & Musical Industries gave way upon publication of a report that was considered disappointing. Associated Equipment reacted upon selling in advance of permission to deal in the shares being given by the Stock Exchange Committee. It is thought that this permission will be granted next week. The first bargains, it may be recalled, were done on the basis of 32s. The price promptly rose to 38s. 6d., and is now back to 34s.

Iron, coal and steel shares maintain their levels, without showing any particular change on the week. The rubber share market awaits definite news in regard to the anticipated agreement of interests on the point of restricted output of raw rubber.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, Oct. 31.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	78/9	—	3 16 0
Brompton Ordinary	1	8½	7	33/-	—	4 4 10
Charing Cross Ordinary	1	8½	7	34/6	—	4 1 2
Chelsea	1	8½	7	32/6	—	4 6 2
City of London	1	10	10	33/9	—	4 3 0
Clyde Valley	1	7	7	39/6	—	3 11 0
County of London	1	10½	10½	56/3	—9d.	3 14 8
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	47/6	—	3 15 9
Elec. Supply Corporation	1	11	11	80/-	—	2 15 0
Kensington Ordinary	1	8	7	34/-	—	4 2 4
Lancs Light and Power	1	7	7	36/6	—	3 17 2
London Electric	1	9	7	34/-	—	4 2 4
Metropolitan	1	10	10	52/6	—	3 16 0
Midland Counties	1	7	7	37/-	—	3 15 8
Mid. Elec. Power	1	8	8	45/-	—	3 11 1
North Eastern Electric Ordinary	1	6	6	33/-	—	3 12 8
Do. 7% Pref.	1	7	7	34/-	—	4 2 4
Northampton	1	10	10	55/-	—	3 12 9
Notting Hill 6% Pref.	10	6	6	13½	—	4 8 11
North Met. Elec. 6% Pref.	1	6	6	30/-	—	4 0 0
St. James' and Pall Mall	1	8	7	34/-	—	4 2 4
Scottish Power	1	8	8	38/9	—	4 2 6
South London	1	8½	7	33/6	—	4 3 7
Westminster Ordinary	1	8½	7	34/-	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/9	—6d.	7 4 7
Yorkshire Elec.	1	8	8	46/3	—¼	3 9 3
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	+1	4 7 6
Do. 1951–73	„	4½	4½	109½	—	4 2 2
Do. 1963–93	„	—	3½	93½	—	3 14 10
London & Home Counties, 1955–75	„	4½	4½	110	—	4 1 10
London Passenger Transport, A	„	—	4½	117	+½	3 17 0
Do. do. B	„	—	5	121	+1½	4 2 8
Do. do. C	„	—	—	82	—4	—
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	119½	—8	7 10 8
Anglo-Am. Tel. Pref.	Stock	6	6	111½	+½	5 4 10
Do. Def.	„	1½	1½	29½	+½	5 1 8
Cables & Wireless 5½% Pref.	„	2¾	2¾	75½	—1	3 12 11
Do. A 7½% Ord.	„	Nil	Nil	25½	—½	—
Do. B Ord.	„	Nil	Nil	12	—½	—
Globe Tel. and T. Ord.	10	Nil	2½	10½	—	2 7 9
Do. do. Pref.	10	6	6	12½	—	4 16 0
Great Northern Tel.	10	20	20	32½	+½	6 3 0
Marconi-Marine	1	10	7½	28/9	—	5 9 1
Oriental Telephone Ord.	1	12	12	2½	+⅛	*4 1 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	3/3	—¼	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	7½	—	—
British Electric Traction Df. Ord.	„	5	5	490	—10	—
Do. do. Pref. Ord.	„	8	8	141½	—	5 10 9
Brazil Traction	100	—	—	13½	—	—
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	103	—	4 17 0
Mexico Trams, 5% Bonds	—	5	5	31½	—	15 16 4
Mexican Light Common	100	Nil	Nil	7½	—	—
Do. 7% Pref.	100	7	7	11	—	—
Do. 1st Bonds	—	5	5	45	—5	11 2 8
Victoria Falls Ord.	1	15	20	5½	+½	3 16 3
Yorkshire (West Riding)	1	Nil	Nil	15/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	4	20/-	—	4 0 0
Do. Pref.	1	8	8	32/6	—	4 18 6
Babcock & Wilcox	1	14	9	39/6	—	4 11 2
British Aluminium Ord.	1	5	5	30/-	—	3 6 8
British Insulated Ord.	1	15	15	73/9	—	3 19 2
Brush Ord.	Stock	Nil	Nil	40	+3	—
Callender's	1	15	15	68/3	—	4 8 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 3
Crompton Parkinson Ord.	5/-	22½	—	18/3	—	6 5 7
Do. 8% Pref.	1	8	8	31/3	+⅛	5 2 5
Edison-Swan 1st Pref.	1	7½	7½	21/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	10/-	+⅛	—
Enfield Cable Ord.	1	25	25	95/-	+⅛	5 5 5
English Electric	1	Nil	Nil	9/6	—	—
Do. do. Pref.	1	Nil	Nil	15/-	—	—
Ever Ready	5/-	35	35	29/3	--	5 19 6
Ferranti Pref.	1	7	7	27/-	—	5 3 8
G.E.C. Pref.	1	6½	6½	32/-	—	4 1 2
Do. Ord.	1	8	8	45/3	—	3 10 8
Henley's	1	30	30	6¾	—	4 12 4
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	3/3	—	—
Johnson & Phillips	1	5	5	20/-	—0d.	5 0 0
Siemens Ord.	1	7½	6¼	21/6	+9d.	5 6 1
Telegraph Construction	£1	Nil	Nil	26/3	+½	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

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229. "Telephonic broadcasting." General Electric Co., Ltd., and W. H. Peters. January 4th, 1932. (399478.)
2236. "Electrical power-transmission systems." Westinghouse Electric & Manufacturing Co. January 24th, 1931. (399479.)
3332. "Electrical relay systems." E. Steadman, F. C. Wolstenholme and Exchange Telegraph Co., Ltd. February 4th, 1932. (399480.)
5910. "Electric discharge devices." British Thomson-Houston Co., Ltd. February 28th, 1931. (399498.)
5929. "Television systems." W. R. Bullimore and L. H. Bedford. February 27th, 1932. (399469.)
6105. "Power-converting apparatus." British Thomson-Houston Co., Ltd. February 28th, 1931. (399481.)
6111. "Manufacture or production of junction fittings for use in connection with electrical conduit tubes." J. Wootton, H. Wootton, T. Somerfield, W. J. Garratt and H. Garratt. February 29th, 1932. (399482.)
6507. "Electric motor control gear." W. Asquith and W. Eastwood. March 4th, 1932. (399483.)
8865. "Method of, and apparatus for, electrically welding pipe, and the welded pipe produced thereby." Republic Steel Corporation. July 15th, 1931. (399474.)
9158. "Thermal switches more especially for use in automatic fire alarm devices." C. H. Stave. March 30th, 1932. (Cognate application 26564/32.) (399490.))
9193. "Thermionic valves." M-O Valve Co., Ltd., D. A. Rankin and C. J. Smithells. March 30th, 1932. (399535.)
9301. "Means for resisting the passage of high-frequency electrical impulses through electric power-transmission wires." M. H. Jarvis. March 31st, 1932. (399476.)
9513. "Thermionic valves or electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 2nd. 1931. (399477.)
9617. "Wireless receiving apparatus." British Radio Corporation, Ltd., and R. S. Bunting. April 4th, 1932. (399500.)
9634. "Electric selective remote control systems." Westinghouse Brake & Saxby Signal Co., Ltd. May 13th, 1931. (399539.)
9637. "Electric signalling systems." General Electric Co., Ltd., and E. P. L. Westell. April 4th, 1932. (399494.)
9887. "Tuning controls for radio apparatus." Standard Telephones & Cables, Ltd., A. d'A. Hodgson, and W. Smith. April 6th, 1932. (399515.)
9888. "Communication systems for alternative telephone and telegraph service." Creed & Co., Ltd. (Teletype Corporation). April 6th, 1932. (399516.)
9921. "Direction control switching arrangements for electrical signalling systems." Electrical Research Products, Inc. April 28th, 1931. (399519.)
9937. "Aerial equipment for aircraft radio installations." Standard Telephones & Cables, Ltd., A. d'A. Hodgson, and H. Larnder. April 7th, 1932. (399543.)
10027. "Frame aerials for wireless reception." Marconi International Marine Communication Co., Ltd., O. D. Kennedy and R. H. Mead. April 7th, 1932. (399548.)
10028. "Radio-receivers suitable for use adjacent to internal-combustion engines." Marconi's Wireless Telegraph Co., Ltd., and A. A. Linsell. April 7th, 1932. (399549.)
10029. "Thermionic amplifiers." Marconi's Wireless Telegraph Co., Ltd., and D. L. Plaistowe. April 7th, 1932. (399550.)
10035. "Television and like apparatus." J. L. Baird and Baird Television, Ltd. April 7th, 1932. (399552.)
10115. "Radiogoniometers." H. Fitzherbert, C. E. Horton, J. F. Coales and R. R. Kent. April 8th, 1932. (399557.)
10244. "Galvanic batteries." C. H. Vince, jun. April 9th, 1932. (399561.)
10466. "Coin collecting and refunding arrangement for telephone systems." Telefonaktiebolaget L. M. Ericsson. April 14th, 1931. (399565.)
10524. "Luminous electric discharge tubes, signs, and designs." G. C. Adams and A. R. Warner. April 12th, 1932. (399566.)
11474. "Electric cables stored in coils and on reels." Callender's Cable & Construction Co., Ltd., and C. A. Chidwick April 21st, 1932. (399577.)
11675. "High-frequency oscillators." Marconi's Wireless Telegraph Co., Ltd. May 8th, 1931. (399579.)
12113. "Cooling arrangement for mercury-arc rectifiers." General Electric Co., Ltd., and E. Gallizia. April 27th, 1932. (399582.)
12258. "Electrode-holder for use in electric arc welding." B. W. Rowe and Associated Electrical Industries, Ltd April 28th, 1932. (399584.)
13678. "Brush holders for dynamo-electric machines." General Electric Co., Ltd., and W. M. Cranston. May 12th, 1932. (399594.)
14509. "Acoustic apparatus." A. H. Midgley. May 21st, 1932. (Addition to 332272.) (399598.)
15403. "Electrical contacts." R. W. Young. May 31st, 1932. (399601.)
16668. "Electrical current transformers." J. H. Buchanan and Associated Electrical Industries, Ltd. June 13th, 1932. (399611.)
17433. "Modulating systems for carrier-wave signalling." General Electric Co., Ltd., H. R. Noble and E. P. L. Westell. June 20th, 1932. (399616.)
17724. "Electric fuse isolators." Switchgear and Equipment, Ltd., and A. G. H. Oxley. June 23rd, 1932. (399618.)
19769. "Devices for measuring spring pressure for use in conjunction with electric contact-making relays, switches, or the like." Ericsson Telephones, Ltd., E. Robinson and A. E. Neville. July 13th, 1932. (399628.)
21041. "Automatic and semi-automatic telephone systems." Siemens Bros. & Co., Ltd., R. I. H. Clark, D. A. Christian and J. E. Tees. July 26th, 1932. (399632.)
23812. "Automatic potentiometers and like balancing arrangements and applications thereof." L. E. Prosser. August 25th, 1932. (399641.)
26278. "Electric signaliing systems." Schneider et Cie. December 19th, 1931. (399645.)
27752. "Secret contact combination electric switches for use as motor vehicle safety devices." W. H. Hesketh. October 6th, 1932. (399651.)
29489. "Television." Electrical & Musical Industries, Ltd., and W. D. Wright. October 12th, 1932. (399654.)
28788. "Cones for loudspeakers." A. S. Millbourn and A. Millbourn & Co., Ltd. October 14th, 1932. (399658.)
32333. "Searchlights with the reflecting surface formed with curved metallic plates." M. Ferrero and E. Salani. November 15th, 1932. (399663.)
32347. "Tramway and railway overhead conductor supports." H. Peace, Ltd., and K. G. Brabner. November 16th, 1932. (399664.)
33469. "Illuminated signs." General Electric Co., Ltd. December 18th, 1931. (399669.)
34825. "Alarm devices for use in connection with automatic telephone systems." J. E. Tuscher and M. Spiro. December 9th, 1931. (Cognate application 34826/32.) (399675.)

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881. "Production of enamelled copper wire for electrical purposes." P. Fustier and Soc. Anon. J. Bocuze et Cie. February 3rd, 1932. (399685.)
1035. "Electric fusible cut-outs." W. R. Loader. February 16th, 1933. (399686.)
1400. "Loud-speakers." Magnavox (Great Britain), Ltd. (Magnavox Co.). January 16th, 1933. (399691.)
2913. "Picture television and like modulated carrier signalling systems." Marconi's Wireless Telegraph Co., Ltd. January 30th, 1932. (399694.)
3055. "Electric circuit breakers having arc-extinguishing structures." Westinghouse Electric & Manufacturing Co. February 16th, 1932. (399695.)
4414. "Thermionic amplifier." Marconi's Wireless Telegraph Co., Ltd. February 12th, 1932. (399703.)
5101. "Electrical resistance furnaces." Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St. Gobain Chauny et Cirey. February 19th, 1932. (399708.)
5599. "Apparatus for producing unidirectional electric current at high voltage." Lodge-Cottrell, Ltd. (International Precipitation Co., Inc.) February 23rd, 1933. (399711.)
5917. "Electric fuses." British Thomson-Houston Co., Ltd. February 27th, 1932. (399712.)
6908. "Gasfilled electric incandescent lamps having spirally shaped incandescent elements." Vereinigte Gluhlampen und Electricitäts Akt.-Ges. April 12th, 1932. (399715.)
6931. "Thermionic oscillation generators." Marconi's Wireless Telegraph Co., Ltd. March 9th, 1932. (399716.)
11524. "Electrical relay or switch mechanism for controlling temperatures or other physical conditions." R. Bosch Akt.-Ges. April 20th, 1932. (399740.)
11742. "Electric water heaters." A. E. Wardle and C. Wright. April 21st, 1933. (399741.)
12297. "Electric cable terminals." British Thomson-Houston Co., Ltd. April 27th, 1932. (Addition to 361742.) (399743.)
12398. "Alternating-current frequency changers employing grid-controlled discharge devices." Akt.-Ges. Brown Boveri et Cie. April 28th, 1932. (399744.)
13920. "Ignition plugs." Siemens and Halske Akt.-Ges. January 5th, 1933. (399752.)
15763. "Controlling device for electric drives for knitting machines." Siemens-Schuckertwerke Akt.-Ges. June 10th, 1932. (Addition to 385833.) (399758.)
16562. "Electrolytic condensers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 10th, 1932. (Addition to 382916.) (399762.)
18412. "Photo-electric relay apparatus." British Thomson-Houston Co., Ltd. June 29th, 1932. (399767.)
18736. Reflector device for electromagnetic radiation of ultra short wavelength. Naamlooze Vennootschap Machinerieen-En Apparaten Fabrieken. September 16th, 1932. (399770.)
19043. "Variable resistances." A. W. Baker and S. C. Mitchell. August 22nd, 1932. (399771.)
23648. "Electrical coupling plugs." J. A. Crabtree and B. G. Harrison. February 25th, 1932. (Divided application on 5611/32.) (399505.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 25th:—

Axiom. No. 543314. Class 8. Electrical transformers.—E. S. Newland, trading as Goodmans, 69 & 97, John Street, E.C.1.

Lambda. No. 544700. Class 8. Thermionic valves.—High Vacuum Valve Co., Ltd., 113-117, Farringdon Road, E.C.1.

Lefran. No. 544747. Class 8. Electric neon advertising signs.—L. F. Mitchell, 35, Jeffreys Street, Camden Town, N.W.1.

The German Siemens Concern in Poland

The Press Department of the Siemens concern, Berlin, announces that the company has entirely withdrawn from the Polish business conducted hitherto by the Polskie Zaklady Siemens. The latter has represented the interests of both the Austrian and the German Siemens companies, and under the management of the Austrian Siemens firms it will maintain a small sales office in Warsaw for conductors, meters and lamps, and also its own office in Katowitz. A representative organisation on a small scale will be built up in Poland by the Siemens-Schuckert Co. of Vienna for the high-pressure business and by the Siemens and Halske Co. of Vienna, for the low-pressure trade.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Angus.—Conversion of Erskine Church, Carnoustie, into cinema; Edward Cowan & Co., solicitors, Dundee.

Ardrossan (AYRSHIRE).—Fire station and houses (£3,500); Black & Shapley, architects.

Banstead.—Nurses' home, Mental Institution (£13,500); Grace & March, Ltd.

Bath.—Conversion of United Hospital into technical college for E.C.; director of education.

Birmingham.—Church of St. Gabriel, Marston Road and Shirley Road, Weoley Castle (£8,000), with electrical work, and shops and flats, Frederick Road, Edgbaston, for J. Cotton, 35, Waterloo Street; T. Elvins & Sons, builders, Soho Hill. Junior school, Weoley Castle Road (£10,463), with electrical work; B. Whitehouse & Sons, builders, Monument Road.

Blyth.—Church, Fifteenth Avenue; Newcastle Diocesan Board.

Bolton.—Cinema at the corner of Tonge Moor Road and Crampton Way for Harold Crossley; W. Bradley, architect, 1, Wood Street.

Bridport.—Houses (34); borough surveyor.

Brighton.—Houses (24), the Avenue, Bevendean; W. A. Gates & Sons, Ltd. Houses (150), Bristol Estate, &c. (£73,000); borough engineer.

Bromley.—Block of shops and flats, Elmfield Road and Holwood Road; Barley & Wadhwa. Junior school and clinic, Bromley Common, for Borough E.C.; director of education.

Canterbury.—Extensions, Beaney Institute, including art gallery and lecture hall; H. M. Enderby, city surveyor.

Chadderton.—Grammar school extensions (£8,000) for the governors; clerk.

Chelmsford.—Cinema, Baddow Road; W. S. D. Winn & Co., builders, Knightsbridge, S.W.1

Cheriton (FOLKESTONE).—Houses (26), Oaks Estate; Mr. Smee.

Chesterfield.—Works extensions, Clayton Street, for J. Clayton & Sons, Ltd. Rebuilding business stores, Knifesmithgate and Stephenson Place, for W. Tinley & Son, Ltd.

Colwyn Bay.—Conference hall and theatre, with electrical work (£60,000); Professor Stanley Adstead, architect, Professor of Civic Design, London University.

Coulsdon.—Houses (108), Woodlands Estate; E. G. Welsby.

Coventry.—Headquarters, Parkside, for the St. John's Ambulance Brigade (£2,000), with electrical work. J. U. Jones, Ltd., builders, Holmesdale Road.

Dumfries.—Houses (140), Nithside; burgh surveyor.

Dunfermline.—Houses (54), Townhill; burgh surveyor.

Durham.—Alterations to West Stanley High Street; remodelling, Howden-le-Wear; and Silksworth Council schools for County E.C.; F. Willey, architect, 34, Old Elvet.

Edinburgh.—Addition to factory at Piershill; G. M. McLaren, architect, Lochburn Road, Maryhill, Glasgow.

Epsom.—Houses (822), Avenue Estate, Worcester Park; Atkinson & Marley, architects, 21, Maddox Street, London, W.1.

Fleetwood.—Houses (96); U.D.C. surveyor.

Gateshead-on-Tyne.—Houses (30), Clyde Street; H. Dodds, builder, High Street. Houses (80) (£29,900); F. H. Patterson, borough engineer, Town Hall.

Glasgow.—Houses (600), Blackhill; housing director and trade contractors. Factory, Rothesay Dock, Clydebank, for the Clyde Cement Co. School (800 places), Cardonald Estate, for E.C.

Hereford.—Milk factory (£60,000); Alderman E. W. Langford, Tupsley Court.

Herne Bay.—Houses (22), Greenhill Gardens; Goodwin & Russell, Ltd.

Huddersfield.—Houses (312); borough surveyor.

Hull.—Houses (40), Priory Road, Cottingham; F. Bilton, builder and contractor, 37, Wincolmlee. Houses (71), Willoughby New Road, Cottingham; Waller & Dobson, builders, Cottingham.

Ilford.—Extensions, King George Hospital (£60,000); secretary.

Irish Free State.—(TRALEE, Co. KERRY).—Installation of electric lighting, Fenit Pier, for the Tralee and Fenit Harbour Commissioners; V. D. Doyle, engineer to the Harbour Commissioners, Tralee.

Jarrow-on-Tyne.—Houses (163), North Ward area; borough engineer.

Kent.—Schools, Bexley Heath and Welling, for County E.C.; director of education, Maidstone.

Kingston-on-Thames.—Houses (30), Dickerage Lane Estate; E. Clarke & Sons, builders.

Leven (FIFE).—Houses (68); Geo. M'Intosh, town clerk, Carberry.

Lochgelly (FIFESHIRE).—Houses (150); burgh surveyor.

London.—(BERMONDSEY).—Flats (63), and shops, Leroy Street (£33,330); Works Department. (DULWICH).—Tenements (233), Dog Kennel Hill (£104,596); Gee, Walker & Slater, Ltd. (EAST HAM).—Tuberculosis clinic, Durban House Site; borough engineer. Alterations to Regal Cinema, High Street; Dixon and Braddock, architects. (ELTHAM).—School, Briset Road (electrical work), for London E.C. School, Middle Park Estate (£25,583); W. H. Gaze & Sons, Ltd., builders, Kingston-on-Thames. (HENDON).—Reconstruction works, Leavesden Hospital (£21,988); Webster & Cannon, Aylesbury. (HIGHGATE).—Cinema, Highgate Road; J. Stanley Beard & Clare, architects. (HONOR OAK).—Tenements, L.C.C. Estate (£59,940); Henry Boot & Sons, Ltd. (HORNSEY).—Town hall (£200,000); R. H. Uren, architect, Hampstead, N.W. (KENSINGTON).—Alterations and improvements to St. Mary Abbots Hospital (£5,233); Triggs & Co., Ltd. (PECKHAM).—Tenements (75), Northfield Estate (£25,943); W. H. Gaze & Sons, Ltd. (POPLAR).—Tenements (43), Bakers Alley (£12,421); R. J. Rowley, Ltd. Municipal buildings; W. G. Culpin, architect. (ROTHERHITHE).—Factory extension, Rotherhithe Old Road; J. J. Knight (Woodware), Ltd. (ST. MARYLEBONE).—Tenements (33), Lilestone Estate (£11,365); Spiers, Ltd. (SOUTHGATE).—Houses (1,200), Oak Lodge Estate; Ernest Owers, Ltd. (WHITECHAPEL).—School (240 places); St. Patricks R.C. trustees.

Market Deeping.—Cinema; Ward & Woolnough, architects, 8, South Brink, Wisbech.

Middlesbrough.—Offices for the National Union of Seamen (£2,500); N. Thompson, builder, Linthorpe.

Mitcham.—Extensions, Wilson Cottage Hospital (£10,000); secretary.

Morecambe.—Houses (66), Devonshire Road Estate, Westgate; Brook & Kershaw. Houses (45), Hyde Road; Edmondson Bros., Ltd.

Newcastle-on-Tyne.—Houses (122), Cambrian Estate; J. W. Braithwaite & Co., builders, Heaton. Houses and shops, Two Ball Lonnen; F. Dryden, architect, 6, Market Street.

Newton Abbot.—Cinema, Wolborough Street, for William C. Gilley, Torquay.

Northampton.—School (600 places), Corby, and infants' school, Croyland Road, Wellingborough, for County E.C. Extensions, Town School (£3,020); W. E. Cockerill & Sons.

Northern Ireland.—(BELFAST).—Maternity hospital, Board of Guardians (£38,825), with electrical work; F. B. McKee & Co., Ltd., builders, 9, Shore Road, Fortwilliam.

North Riding.—School, Whitby, for C.C.; J. R. White, county architect, Northallerton.

Norton (YORKS).—Houses (24), Beverley Road; U.D.C. surveyor.

Nottingham.—Houses (90), fronting Westdale Lane, Mapperley, for the Co-operative Society, Ltd., Nottingham Road. Cinema, Angel Row; E. D. Winn & Co., Ltd., builders, Wilton Place, London, S.W.1.

Oldbury.—Cinema, Warley (£25,000); Satchwell & Roberts, architects, 7, Waterloo Street, Birmingham.

Pinner.—Thirteen shops and flats, Pinner Road; W. A. Ross.

Purley.—Houses (743), Old Lodge Estate; Old Lodge Estates (Purley), Ltd.

Rochester.—Houses (72); city surveyor.

St. Austell (CORNWALL).—Houses (60), Polkyth housing scheme; E. D. Groves, surveyor, Municipal Offices.

Salford.—Senior schools, Broughton (£57,600), for Borough E.C.; director of education.

Sanderstead.—Houses (135), Park Farm Estate; Industrial Builders, Ltd. Eleven shops and houses, Addington Road; A. Frampton. Twelve shops and houses, Cranleigh Parade; Brice & Co. Eighteen shops, Limpsfield Road; W. J. L. Horsman.

Seahouses (NORTHUMBERLAND).—Houses (40); Marshall and Tweedy, architects, 129, Pilgrim Street, Newcastle-on-Tyne.

Sedbergh (YORKS).—Houses (55); R.D.C. surveyor.

Selsdon.—Houses (60), Addington Road; R. Costain, Ltd.

Shipston-on-Stour.—Houses (24); E. H. Earp, R.D.C. architect, 48, Henley Street, Stratford-on-Avon.

Southall.—Extensions, technical college (£16,727); A. & B. Hanson, Ltd.

Stafford (STAFFORDSHIRE). — Mental hospital extensions (£167,440), with heating and lighting work; Burntwood and Cheddleton, for the Mental Hospital Board; clerk.

Stirlingshire.—School, Stirling (£17,169), for County E.C.; county architect, Stirling.

Stoke-on-Trent.—Houses (88), Carmountside Estate, and 120 at Shelton Estate; city engineer.

Stratford-on-Avon.—Alterations, &c. (£10,000), Picture House; manager.

Stretford.—Infants' school, Moss Park (£9,264), for E.C.

Tamworth.—Houses (88), Hockley; N. Hyde, builder, Sedgley.

Wallasey.—Aerodrome, Upton Park; Blackpool & West Coast Air Service, Ltd. Promenade extension (£517,000); Edmund Nuttall, Sons & Co., Ltd. School, Moreton; Catholic trustees. School, Roods Lane, for E.C.

Walsall.—Aerodrome buildings, including clubroom and offices, Aldridge; borough surveyor.

Watford.—Houses (26), Sheepcot Lane; Hillingdon Estate Co., Ltd.

Wealdstone (MIDDLESEX).—Houses (20), Charlton Road; N. D. Maidman. Cinema, Kenton Road; Bacal, Wadhaw & Keogh.

West Hartlepool.—Secondary school, Brinkburn, for E.C.; F. Durkin, borough engineer.

Whickham-on-Tyne. — Houses, Swalwell; Shield Bros., builders, Swalwell.

Wolverhampton.—Houses (30), Cannock Road; A. M. Boswell, builder, School Street. Houses (44), Penn Estate; Arthur M. Griffiths & Son, Ltd., builders, Thomas Street. Building extensions for the Goodyear Tyre & Rubber Co. (Great Britain), Ltd., £60,000; Wilson-Lovatt & Sons, Ltd., Clarence Street.

Russian Electrical Machinery Imports

According to a return lately issued, 12,195 metric tons of electrical machinery and apparatus, valued at £1,168,500, were imported into Soviet Russia during the six months ended with June last, as compared with 28,855 tons and £4,361,800 respectively in the corresponding half of 1932.